

Designing to the 2021 IBC



Shums Coda Associates, Inc.



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Instructor Steve Thomas, CBO

- Colorado Regional Manager, Education Director
- >40-years' experience in code administration
- ICBO Committees
 - Small Jurisdictions
 - Fire & Life Safety Code Development
 - Means of Egress Review
- ICC Means of Egress Code Development, Codes and Standards and Code Correlation Committees
- Author of Building Code Basics, based on 2009 & 2012 IBC, Building Code Essentials 2015 & 2018 IBC, Applying Codes to Cannabis Facilities



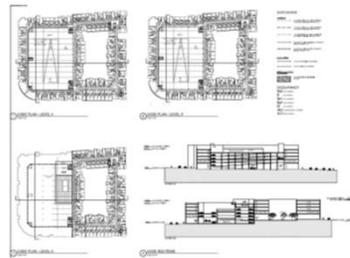
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Agenda

- Submittal Requirements
- Code Analysis
- Showing Fire Resistive Rated Construction
- Showing the Means of Egress
- Special Inspections



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107.1 Submittal Documents

- Submittal documents consisting of construction documents, statement of special inspections, geotechnical report and other data shall be submitted in two or more sets, or in a digital format where allowed by the building official, with each permit application.



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107.1 Submittal Documents



- The construction documents shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

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107.1 Submittal Documents

- Where special conditions exist, the building official is authorized to require additional construction documents to be prepared by a registered design professional.



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107.1 Submittal Documents



- Exception: The building official is authorized to waive the submission of construction documents and other data not required to be prepared by a registered design professional if it is found that the nature of the work applied for is such that review of construction documents is not necessary to obtain compliance with this code.

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107.2.1 Information on construction documents

- Construction documents shall be dimensioned and drawn upon suitable material.
- Electronic media documents are permitted to be submitted when approved by the building official.



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107.2.1 Information on construction documents

- Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.



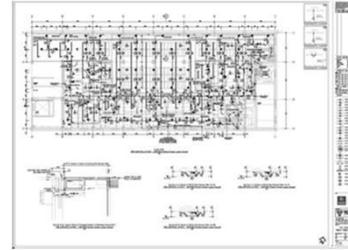
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107.2.2 Fire protection system shop drawings

- Shop drawings for the fire protection system(s) shall be submitted to indicate conformance to this code and the construction documents and shall be approved prior to the start of system installation. Shop drawings shall contain all information as required by the referenced installation standards in Chapter 9.



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107.2.3 Means of egress

- The construction documents shall show in sufficient detail the location, construction, size and character of all portions of the means of egress including the path of the exit discharge to the public way in compliance with the provisions of this code. In other than occupancies in Groups R-2, R-3, and I-1, the construction documents shall designate the number of occupants to be accommodated on every floor, and in all rooms and spaces.



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107.2.4 Exterior wall envelope

- Construction documents for all buildings shall describe the exterior wall envelope in sufficient detail to determine compliance with this code.
- The construction documents shall provide details of the exterior wall envelope as required, including flashing, intersections with dissimilar materials, corners, end details, control joints, intersections at roof, eaves or parapets, means of drainage, water-resistive barrier and details around openings.



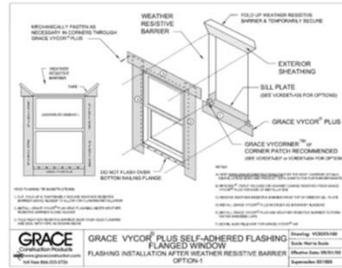
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107.2.4 Exterior wall envelope

- The construction documents shall include manufacturer's installation instructions that provide supporting documentation that the proposed penetration and opening details described in the construction documents maintain the weather resistance of the exterior wall envelope.
- The supporting documentation shall fully describe the exterior wall system which was tested, where applicable, as well as the test procedure used.



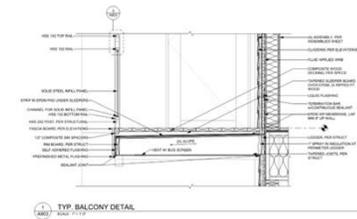
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107.2.5 – Exterior balconies and elevated walking surfaces

- Where balconies or other elevated walking surfaces have weather-exposed surfaces, and the structural framing is protected by an impervious moisture barrier, the construction documents shall include details for all elements of the impervious moisture barrier system.
- The construction documents shall include manufacturer's installation instructions.

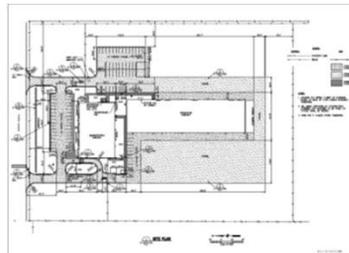


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107.2.6 Site plan



- The construction documents submitted with the application for permit shall be accompanied by a site plan showing to scale the size and location of new construction and existing structures on the site, distances from lot lines, the established street grades and the proposed finished grades and, as applicable, flood hazard areas, floodways, and design flood elevations; and it shall be drawn in accordance with an accurate boundary line survey.

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107.2.5 Site plan

- In the case of demolition, the site plan shall show construction to be demolished and the location and size of existing structures and construction that are to remain on the site or plot.
- The building official is authorized to waive or modify the requirement for a site plan when the application for permit is for alteration or repair or when otherwise warranted.



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107.2.6 Structural information

- The construction documents shall provide the information specified in Section 1603.

SECTION 1603 DESIGN LOADS

NO.	AREA	TYPE OF LOAD	LOAD VALUE	LOAD DIRECTION	REMARKS
1	ROOF	DEAD	15	VERTICAL	ROOF SLAB
2	FLOOR	DEAD	15	VERTICAL	FLOOR SLAB
3	FLOOR	LIVE	40	VERTICAL	OFFICE
4	FLOOR	LIVE	60	VERTICAL	RETAIL
5	FLOOR	LIVE	100	VERTICAL	THEATER
6	FLOOR	LIVE	120	VERTICAL	RESTAURANT
7	FLOOR	LIVE	150	VERTICAL	CONCOURSE
8	FLOOR	LIVE	200	VERTICAL	MEZANINE
9	FLOOR	LIVE	250	VERTICAL	MEZANINE
10	FLOOR	LIVE	300	VERTICAL	MEZANINE
11	FLOOR	LIVE	350	VERTICAL	MEZANINE
12	FLOOR	LIVE	400	VERTICAL	MEZANINE
13	FLOOR	LIVE	450	VERTICAL	MEZANINE
14	FLOOR	LIVE	500	VERTICAL	MEZANINE
15	FLOOR	LIVE	550	VERTICAL	MEZANINE
16	FLOOR	LIVE	600	VERTICAL	MEZANINE
17	FLOOR	LIVE	650	VERTICAL	MEZANINE
18	FLOOR	LIVE	700	VERTICAL	MEZANINE
19	FLOOR	LIVE	750	VERTICAL	MEZANINE
20	FLOOR	LIVE	800	VERTICAL	MEZANINE
21	FLOOR	LIVE	850	VERTICAL	MEZANINE
22	FLOOR	LIVE	900	VERTICAL	MEZANINE
23	FLOOR	LIVE	950	VERTICAL	MEZANINE
24	FLOOR	LIVE	1000	VERTICAL	MEZANINE
25	FLOOR	LIVE	1050	VERTICAL	MEZANINE
26	FLOOR	LIVE	1100	VERTICAL	MEZANINE
27	FLOOR	LIVE	1150	VERTICAL	MEZANINE
28	FLOOR	LIVE	1200	VERTICAL	MEZANINE
29	FLOOR	LIVE	1250	VERTICAL	MEZANINE
30	FLOOR	LIVE	1300	VERTICAL	MEZANINE
31	FLOOR	LIVE	1350	VERTICAL	MEZANINE
32	FLOOR	LIVE	1400	VERTICAL	MEZANINE
33	FLOOR	LIVE	1450	VERTICAL	MEZANINE
34	FLOOR	LIVE	1500	VERTICAL	MEZANINE
35	FLOOR	LIVE	1550	VERTICAL	MEZANINE
36	FLOOR	LIVE	1600	VERTICAL	MEZANINE
37	FLOOR	LIVE	1650	VERTICAL	MEZANINE
38	FLOOR	LIVE	1700	VERTICAL	MEZANINE
39	FLOOR	LIVE	1750	VERTICAL	MEZANINE
40	FLOOR	LIVE	1800	VERTICAL	MEZANINE
41	FLOOR	LIVE	1850	VERTICAL	MEZANINE
42	FLOOR	LIVE	1900	VERTICAL	MEZANINE
43	FLOOR	LIVE	1950	VERTICAL	MEZANINE
44	FLOOR	LIVE	2000	VERTICAL	MEZANINE
45	FLOOR	LIVE	2050	VERTICAL	MEZANINE
46	FLOOR	LIVE	2100	VERTICAL	MEZANINE
47	FLOOR	LIVE	2150	VERTICAL	MEZANINE
48	FLOOR	LIVE	2200	VERTICAL	MEZANINE
49	FLOOR	LIVE	2250	VERTICAL	MEZANINE
50	FLOOR	LIVE	2300	VERTICAL	MEZANINE
51	FLOOR	LIVE	2350	VERTICAL	MEZANINE
52	FLOOR	LIVE	2400	VERTICAL	MEZANINE
53	FLOOR	LIVE	2450	VERTICAL	MEZANINE
54	FLOOR	LIVE	2500	VERTICAL	MEZANINE
55	FLOOR	LIVE	2550	VERTICAL	MEZANINE
56	FLOOR	LIVE	2600	VERTICAL	MEZANINE
57	FLOOR	LIVE	2650	VERTICAL	MEZANINE
58	FLOOR	LIVE	2700	VERTICAL	MEZANINE
59	FLOOR	LIVE	2750	VERTICAL	MEZANINE
60	FLOOR	LIVE	2800	VERTICAL	MEZANINE
61	FLOOR	LIVE	2850	VERTICAL	MEZANINE
62	FLOOR	LIVE	2900	VERTICAL	MEZANINE
63	FLOOR	LIVE	2950	VERTICAL	MEZANINE
64	FLOOR	LIVE	3000	VERTICAL	MEZANINE
65	FLOOR	LIVE	3050	VERTICAL	MEZANINE
66	FLOOR	LIVE	3100	VERTICAL	MEZANINE
67	FLOOR	LIVE	3150	VERTICAL	MEZANINE
68	FLOOR	LIVE	3200	VERTICAL	MEZANINE
69	FLOOR	LIVE	3250	VERTICAL	MEZANINE
70	FLOOR	LIVE	3300	VERTICAL	MEZANINE
71	FLOOR	LIVE	3350	VERTICAL	MEZANINE
72	FLOOR	LIVE	3400	VERTICAL	MEZANINE
73	FLOOR	LIVE	3450	VERTICAL	MEZANINE
74	FLOOR	LIVE	3500	VERTICAL	MEZANINE
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78	FLOOR	LIVE	3700	VERTICAL	MEZANINE
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80	FLOOR	LIVE	3800	VERTICAL	MEZANINE
81	FLOOR	LIVE	3850	VERTICAL	MEZANINE
82	FLOOR	LIVE	3900	VERTICAL	MEZANINE
83	FLOOR	LIVE	3950	VERTICAL	MEZANINE
84	FLOOR	LIVE	4000	VERTICAL	MEZANINE
85	FLOOR	LIVE	4050	VERTICAL	MEZANINE
86	FLOOR	LIVE	4100	VERTICAL	MEZANINE
87	FLOOR	LIVE	4150	VERTICAL	MEZANINE
88	FLOOR	LIVE	4200	VERTICAL	MEZANINE
89	FLOOR	LIVE	4250	VERTICAL	MEZANINE
90	FLOOR	LIVE	4300	VERTICAL	MEZANINE
91	FLOOR	LIVE	4350	VERTICAL	MEZANINE
92	FLOOR	LIVE	4400	VERTICAL	MEZANINE
93	FLOOR	LIVE	4450	VERTICAL	MEZANINE
94	FLOOR	LIVE	4500	VERTICAL	MEZANINE
95	FLOOR	LIVE	4550	VERTICAL	MEZANINE
96	FLOOR	LIVE	4600	VERTICAL	MEZANINE
97	FLOOR	LIVE	4650	VERTICAL	MEZANINE
98	FLOOR	LIVE	4700	VERTICAL	MEZANINE
99	FLOOR	LIVE	4750	VERTICAL	MEZANINE
100	FLOOR	LIVE	4800	VERTICAL	MEZANINE

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Code Analysis

- A road map to explain how the project complies with the code.
- Speeds up plan review
- Provides documentation for the archives

CODE ANALYSIS

SECTION 1

Project Description

This is a mixed-use 15-story residential building. An internal parking garage extends from level 5 through level 8. The first and second level include the lobby and entrance for the residential building. A mezzanine is located on the east end of the building on the first and second levels. The mezzanine will be located on levels 1-5. There are also seven three-story parking units along the south side of the building. There are parking spaces on Levels 9 and 11. The building contains 712 dwelling units and 217 parking spaces. The building will be constructed as a Type IIA Construction High-Rise building. The fire protection strategy of the building elements will be reviewed in accordance with Section 403.2.1.

Applicable Codes and Standards

The City and County of Denver Building Department accepts the following referenced codes with local amendments:

- 2015 International Building Code (IBC)
- 2015 International Mechanical Code (IMC)
- 2015 International Fuel Gas Code (IFGC)
- 2015 International Plumbing Code (IPC)
- 2015 International Energy Conservation Code (IECC)
- 2015 International Fire Code (IFC)
- 2005 National Electrical Code (NEC)
- 2005 IBC AS175.1 Accessible and Usable Buildings and Facilities
- 2013 ASME/A17.1 ICCSA Best Safety Code for Elevators and Escalators
- 2019 Denver Amendments

NFPA Standards

- NFPA 80 - Standard for Fire Extinguishers, 2013
- NFPA 13 - Standard for Installation of Sprinkler Systems, 2019
- NFPA 16 - Standard for the Installation of Foam and Foam-Aqueous Systems, 2019
- NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection, 2019
- NFPA 72 - National Fire Alarm and Signaling Code, 2019
- NFPA 110 - Emergency and Standby Electrical System, 2013

Other Submittals

The following related submittals will be provided for this project (IBC 107.3.4.1):

- Automated Fire Sprinkler System
- Standpipe System
- Fire Alarm System
- Smoke Control Clear Pressurization

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Project Narrative

- Describe project to assist plans examiner understand what the project is about.



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Zoning Information

- Zone District
- Area
- Height
- Floor Area Ratio
- Parking



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Applicable Codes

Applicable Codes and Standards

The City and County of Denver Building Department adopts the following referenced codes with local amendments:

- 2015 International Building Code (IBC)
- 2015 International Mechanical Code (IMC)
- 2015 International Fuel Gas Code (IFGC)
- 2015 International Plumbing Code (IPC)
- 2015 International Energy Conservation Code (IECC)
- 2015 International Fire Code (IFC)
- 2020 National Electrical Code (NEC)
- 2009 ICC A117.1 Accessible and Usable Buildings and Facilities
- 2013 ASME A17.1/CSA B44 Safety Code for Elevators and Escalators
- 2019 Denver Amendments

NFPA Standards

- NFPA 10 – Portable Fire Extinguishers, 2013
- NFPA 13 – Standard for Installation of Sprinkler Systems, 2019
- NFPA 14 – Standard for the Installation of Standpipe and Hose System, 2019
- NFPA 20 – Standard for the Installation of Stationary Pumps for Fire Protection, 2019
- NFPA 72 – National Fire Alarm and Signaling Code, 2019
- NFPA 110 – Emergency and Standby Electrical System, 2013

- Codes
- Standards
- Current amendments

107.3.4.1 Deferred submittals

- Deferral of any submittal items shall have the prior approval of the building official.
- The registered design professional in responsible charge shall list the deferred submittals on the construction documents for review by the building official.

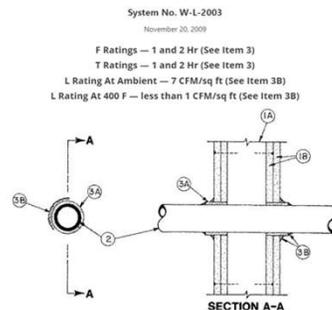
Deferred Submittals

The following deferred submittals will be provided for this project. (IBC 107.3.4.1)

- Automatic Fire Sprinkler System
- Standpipe System
- Fire Alarm System
- Smoke Control (Stair Pressurization)
- Through Penetrations Firestop Systems
- Joint Treatment Systems
- Elevators
- Swimming Pool and Equipment
- Signage
 - Entry Sign
 - Building Signage
 - Site Signage

107.3.4.1 Deferred submittals

- Documents for deferred submittal items shall be submitted to the registered design professional in responsible charge who shall review them and forward them to the building official with a notation indicating that the deferred submittal documents have been reviewed and found to be in general conformance to the design of the building.
- The deferred submittal items shall not be installed until the deferred submittal documents have been approved by the building official.



Basic Information



- Occupancy Classification
- Type of Construction
- Fire Sprinkler Information
- Mixed Occupancy Information
- Structural Parameters

Occupancy Classification

- Chapter 3
 - Structures shall be classified into one or more of the occupancy groups specified in this section based on the nature of the hazards and risks to building occupants generally associated with the intended purpose of the building or structure.
 - An area, room or space that is intended to be occupied at different times for different purposes shall comply with all applicable requirements associated with such potential multipurpose.
- Assembly: Groups A-1, A-2, A-3, A-4 and A-5
- Business: Group B
- Educational: Group E
- Factory and Industrial: Groups F-1 and F-2
- High Hazard: Groups H-1, H-2, H-3, H-4 and H-5
- Institutional: Groups I-1, I-2, I-3 and I-4
- Mercantile: Group M
- Residential: Groups R-1, R-2, R-3 and R-4
- Storage: Groups S-1 and S-2
- Utility and Miscellaneous: Group U

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Type of Construction

- Chapter Six
 - Type IA & IB
 - Type IIA & IIB
 - Type IIIA & IIIB
 - Type IV
 - Type VA & VB



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Flame Spread

TABLE 803.9
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCY^a

GROUP	SPRINKLERED			NONSPRINKLERED		
	Interior exit stairways, interior exit ramps and exit passageways ^b	Corridors and enclosure for exit access stairways and exit access ramps	Rooms and enclosed spaces ^c	Interior exit stairways, interior exit ramps and exit passageways ^b	Corridors and enclosure for exit access stairways and exit access ramps	Rooms and enclosed spaces ^c
A-1 & A-2	B	B	C	A	A ^d	B ^e
A-3 ^f , A-4, A-5	B	B	C	A	A ^d	C
B, E, M, R-1	B	C	C	A	B	C
R-4	B	C	C	A	B	B
F	C	C	C	B	C	C
H	B	B	C ^g	A	A	B
I-1	B	C	C	A	B	B
I-2	B	B	B ^{h,i}	A	A	B
I-3	A	A ^j	C	A	A	B
I-4	B	B	B ^{h,i}	A	A	B
R-2	C	C	C	B	B	C
R-3	C	C	C	C	C	C
S	C	C	C	B	B	C
U	No restrictions			No restrictions		

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Fire Sprinkler Information



- Type of Automatic Fire Sprinkler System
 - NFPA 13
 - NFPA 13R
 - NFPA 13D

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Mixed Occupancies Information

- Separated Occupancies
- Non-Separated Occupancies
- Accessory Occupancies



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Structural Parameters

- Seismic Design Category
- Wind Load
- Snow Load
- Risk Category



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506.1 Building Area Modification

- The floor area of a building shall be determined based on the type of construction, occupancy classification, whether there is an automatic sprinkler system installed throughout the building and the amount of building frontage on public way or open space.

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Building Height

- The vertical distance from grade plane to the average height of the highest roof surface.



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Grade Plane

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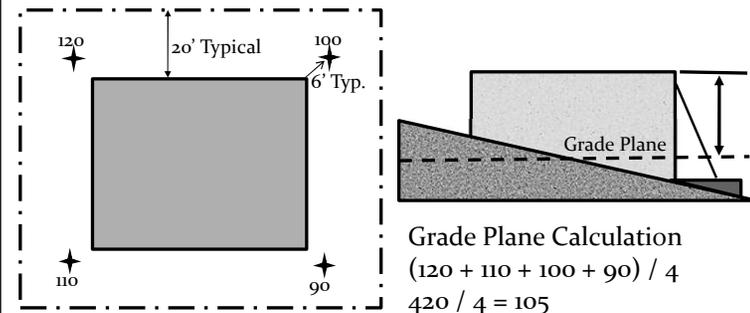
- A reference plane representing the average of finished ground level adjoining the building at exterior walls .
- Where the finished ground level slopes away from the exterior walls , the reference plane shall be established by the lowest points within the area between the building and the lot line or, where the lot line is more than 6 feet from the building, between the building and a point 6 feet from the building.

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Problem #1



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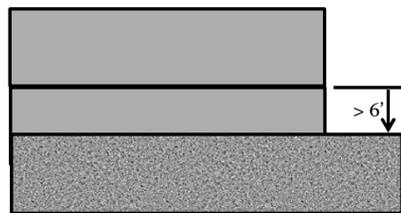
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Story Above Grade Plane

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- Any story having its finished floor surface entirely above grade plane , or in which the finished surface of the floor next above is:
 1. More than 6 feet above grade plane ; or



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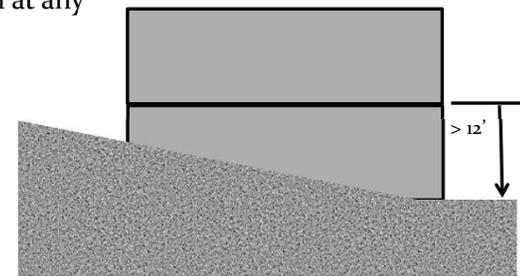
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Story Above Grade Plane

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- 2. More than 12 feet above the finished ground level at any point.



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Allowable Building Height Table 504.3

**TABLE 504.3
ALLOWABLE BUILDING HEIGHT IN FEET ABOVE GRADE PLANE***

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION												
		Type I		Type II		Type III		Type IV			HT	Type V		
		A	B	A	B	A	B	A	B	C		A	B	
A, B, E, F, M, S, U	NS ^b	UL	160	65	55	65	55	65	65	65	65	65	50	40
	S	UL	180	85	75	85	75	270	180	85	85	70	60	
H-1, H-2, H-3, H-5	NS ^{c-d}	UL	160	65	55	65	55	120	90	65	65	50	40	
	S	UL	180	85	75	85	75	140	100	85	85	70	60	
H-4	NS ^{c-d}	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	140	100	85	85	70	60	
I-1 Condition 1, I-3	NS ^{d-e}	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	180	120	85	85	70	60	
I-1 Condition 2, I-2	NS ^{d-e,f}	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	180	120	85	85	70	60	
I-4	NS ^{d-g}	UL	160	65	55	65	55	65	65	65	65	50	40	
	S	UL	180	85	75	85	75	180	120	85	85	70	60	
R ^h	NS ^d	UL	160	65	55	65	55	65	65	65	65	50	40	
	S13D	60	60	60	60	60	60	60	60	60	60	50	40	
	S13R	60	60	60	60	60	60	60	60	60	60	60	60	
	S	UL	180	85	75	85	75	270	180	85	85	70	60	

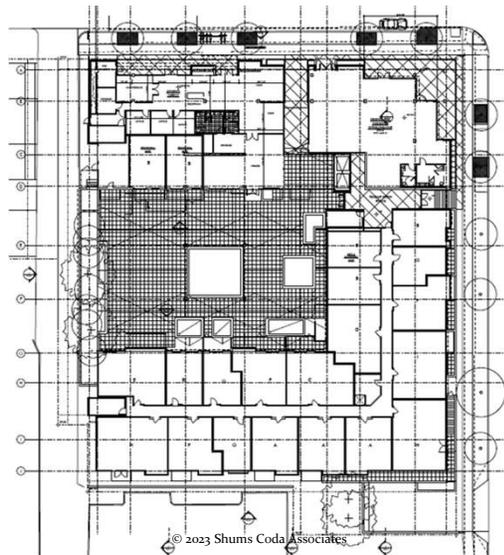
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Allowable Building Height Table 504.4

**TABLE 504.4
ALLOWABLE NUMBER OF STORIES ABOVE GRADE PLANE^{a,b}**

OCCUPANCY CLASSIFICATION	See Footnotes	TYPE OF CONSTRUCTION												
		Type I		Type II		Type III		Type IV			HT	Type V		
		A	B	A	B	A	B	A	B	C		A	B	
A-1	NS	UL	5	3	2	3	2	3	3	3	3	3	2	1
	S	UL	6	4	3	4	3	9	6	4	4	4	3	2
A-2	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	1
A-3	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	1
A-4	NS	UL	11	3	2	3	2	3	3	3	3	3	2	1
	S	UL	12	4	3	4	3	18	12	6	4	3	2	1
A-5	NS	UL	UL	UL	UL	UL	UL	1	1	1	UL	UL	UL	UL
	S	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
B	NS	UL	11	5	3	5	3	5	5	5	5	5	3	2
	S	UL	12	6	4	6	4	18	12	9	6	4	3	2

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EAST ELEVATION - 16TH ST

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Building Area



- The area included within surrounding exterior walls (or exterior walls and fire walls) exclusive of vent shafts and courts.
- Areas of the building not provided with surrounding walls shall be included in the building area if such areas are included within the horizontal projection of the roof or floor above.

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Building Area

- Separated by story
- Separated by Occupancy
- Keep up to date as plans are revised

1. BUILDING DESCRIPTION

1.1 Actual Building Area

Description	Occ. Class	Basement	Ground	Story					
				1	2	3	4	5	
Bus Transit Garage	S-2	35152							
RTD - Pedestrian Area	A-3	20009							
Parking Garage	S-2		27582	21819	21819	21819	21819	21819	21819
Residential	R-2			15568	22181	23620	23620		
Total Area per Story		55161	27582	37387	44000	45439	45439	21819	
Total Building Area		276827							

1.2 Building Height

Stories	Maximum	
	Allowed	Actual
four	70 ft.	45 feet

Height increase for sprinklers per Section 504.2 used.

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503.1 Allowable Building Area

- Unless otherwise specifically modified in Chapter 4 and this chapter, building height, number of stories and building area shall not exceed the limits specified in Sections 504 and 506 based on the type of construction as determined by Section 602 and the occupancies as determined by Section 302 except as modified hereafter.



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Allowable Building Areas Table 506.2

TABLE 506.2 ALLOWABLE AREA FACTOR (A, = NS, S1, S13R, S13D or SM, as applicable) IN SQUARE FEET^{a, b}

OCCUPANCY CLASSIFICATION	SEE FOOTNOTES	TYPE OF CONSTRUCTION											
		Type I		Type II		Type III		Type IV			HT	Type V	
		A	B	A	B	A	B	A	B	C		A	B
A-1	NS	UL	UL	15,500	8,500	14,000	8,500	45,000	30,000	18,750	15,000	11,500	5,500
	S1	UL	UL	62,000	34,000	56,000	34,000	180,000	120,000	75,000	60,000	46,000	22,000
	SM	UL	UL	46,500	25,500	42,000	25,500	135,000	90,000	56,250	45,000	34,500	16,500
A-2	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-3	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-4	NS	UL	UL	15,500	9,500	14,000	9,500	45,000	30,000	18,750	15,000	11,500	6,000
	S1	UL	UL	62,000	38,000	56,000	38,000	180,000	120,000	75,000	60,000	46,000	24,000
	SM	UL	UL	46,500	28,500	42,000	28,500	135,000	90,000	56,250	45,000	34,500	18,000
A-5	NS												
	S1	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL	UL
	SM												
B	NS	UL	UL	37,500	23,000	28,500	19,000	108,000	72,000	45,000	36,000	18,000	9,000
	S1	UL	UL	150,000	92,000	114,000	76,000	432,000	288,000	180,000	144,000	72,000	36,000
	SM	UL	UL	112,500	69,000	85,500	57,000	324,000	216,000	135,000	108,000	54,000	27,000

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Allowable area Determination 506

$$A_a = A_t + [NS \times I_f]$$

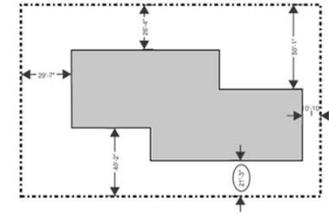
- Single-Occupancy
- Equation 5-1
 - A_a = Allowable building area per story
 - A_t = Tabular building area per story in accordance with Table 506.2
 - NS = Tabular allowable area factor in accordance with Table 506.2 for nonsprinklered building
 - I_f = Area increase factor due to frontage (506.2)

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506.3.2 Minimum frontage distance

- The frontage increase shall be based on the smallest public way or open space that is 20 feet or greater, and the percentage of building perimeter having a minimum 20 feet public way or open space.



Perimeter with > 20' yard = 364'
Total Perimeter = 406'
364/406 = 90%
Smallest Yard = 21' 3"

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506.3.3 Amount of increase

- The area factor increase based on frontage shall be determined in accordance with Table 506.3.3.

TABLE 506.3.3
FRONTAGE INCREASE FACTOR*

PERCENTAGE OF BUILDING PERIMETER	OPEN SPACE (feet)			
	0 to less than 20	20 to less than 25	25 to less than 30	30 or greater
0 to less than 25	0	0	0	0
25 to less than 50	0	0.17	0.21	0.25
50 to less than 75	0	0.33	0.42	0.50
75 to 100	0	0.50	0.63	0.75

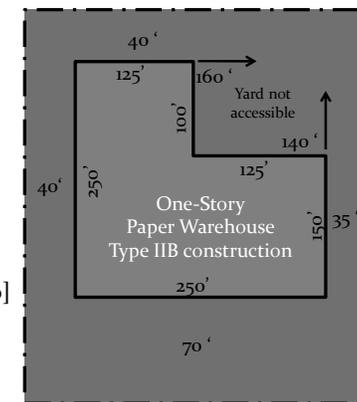
90% Building Perimeter
Yard Dimension = 21' 3"
Frontage Increase = 50%

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Frontage Increase Example #2

- Determine I_f :
Perimeter > 20' = 775'
Total Perimeter = 1000'
Percentage = 775/1000 = 53%
Smallest Yard > 20' = 35'
 $I_f = 0.50$
- Determine A_a :
 - $A_a = A_t + [NS \times I_f]$
 - $A_a = 17,500 + [17,500 \times 0.50]$
 - $A_a = 17,500 + 8,750$
 - $A_a = 26,250$



Actual Area = 50,000 sq. ft.

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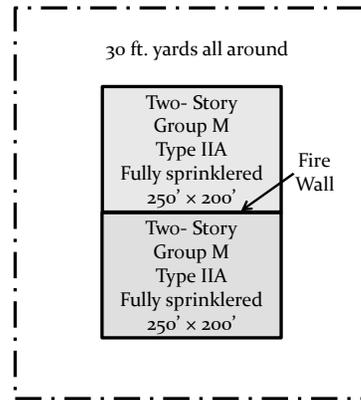
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Buildings with Fire Walls

- Section 503.1
 - Each portion of a building separated by one or more fire walls complying with Section 706 shall be considered to be a separate building.
- Separate calculations for each building



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Buildings with Fire Walls Example

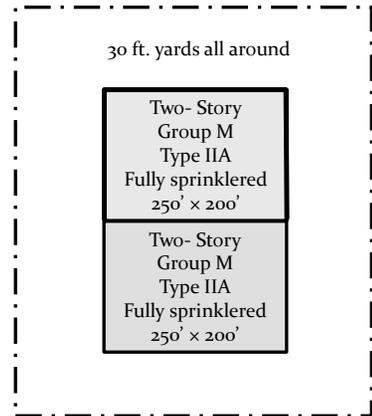
72% perimeter, 30' yard
 $I_f = 0.50$

$$A_a = 64,500 + [21,500 \times 0.50]$$

$$A_a = 64,500 + 10,750$$

$$A_a = 75,250 \text{ sq. ft.}$$

Actual Area per story per building = 50,000 sq. ft.



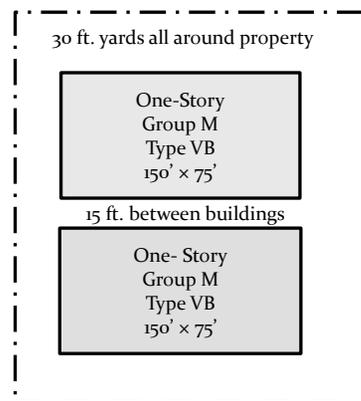
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Two Buildings on the Same Lot 503.1.2

- Two or more buildings on the same lot shall be regulated as separate buildings or shall be considered as portions of one building where the building height, number of stories of each building and the aggregate building area of the buildings are within the limitations specified in Sections 504 and 506.
- The provisions of this code applicable to the aggregate building shall be applicable to each building.



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Two Buildings on the Same Lot Example

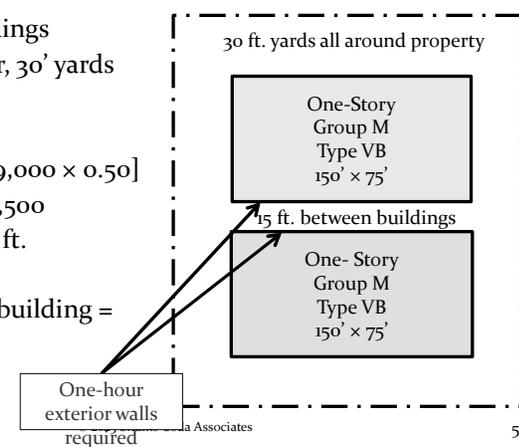
- Separate Buildings
 67% perimeter, 30' yards
 $I_f = 0.50$

$$A_a = 9,000 + [9,000 \times 0.50]$$

$$A_a = 9,000 + 4,500$$

$$A_a = 13,500 \text{ sq. ft.}$$

Actual Area per building = 11,250 sq. ft.



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Two Buildings on the Same Lot Example

- Considered One Building

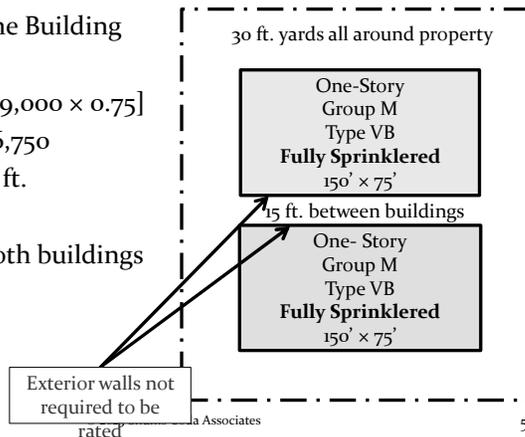
$$I_f = 0.75$$

$$A_a = 36,000 + [9,000 \times 0.75]$$

$$A_a = 36,000 + 6,750$$

$$A_a = 42,750 \text{ sq. ft.}$$

Actual Area of both buildings
= 22,500 sq. ft.



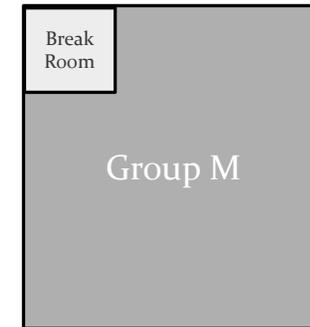
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Accessory Occupancies

508.2.1

- Aggregate accessory occupancies shall not occupy more than 10 percent of the building area of the story in which they are located
- Cannot not exceed the tabular values in Table 503, without building area increases
- Type IIB Const
- Group M = 100,000 s.f.
- Break Room limited to 9,500 square feet (Table 503)



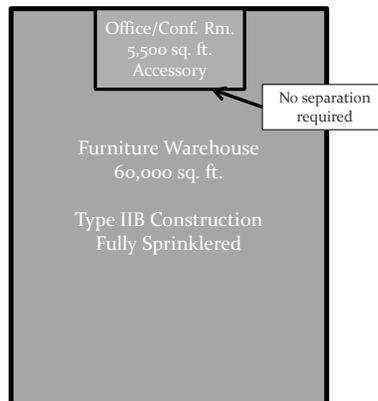
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Accessory Occupancy Example

- Group B Area = 9.2% of building area (<10%)
- Tabular Area NS Group B = 23,000 sq. ft.
- Maximum Height Group B = 3 stories
- Offices are accessory occupancies
- Total Allowable Building Area based on Group S-1 Occupancy
 - $A_a = 70,000$ with sprinklers.



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Unlimited Area Buildings

507.1

- The area of buildings of the occupancies and configurations specified in Sections 507.1 through 507.12 shall not be limited. Basements not more than one story below grade plane shall be permitted.
- Accessory occupancies shall be permitted in unlimited area buildings in accordance with the provisions of Section 508.2, otherwise the requirements of Sections 507.2 through 507.12 shall be applied, where applicable.



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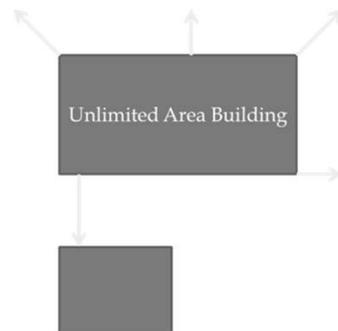
56

Measurement of open spaces

507.2

- Where Sections 507.2 through 507.12 require buildings to be surrounded and adjoined by public ways and yards, those open spaces shall be determined as follows:

- Yards shall be measured from the building perimeter in all directions to the closest interior lot lines or to the exterior face of an opposing building located on the same lot, as applicable.
- Where the building fronts on a public way, the entire width of the public way shall be used.



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Nonseparated Occupancies

508.3

- Nonseparated occupancies shall be individually classified in accordance with Section 302.1.
- Allowable area based on most restrictive occupancy.
- No separation between occupancies
 - exceptions



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2. BUILDING REVIEW

2.1a Building Perimeter Calculation

Building Face	Open Space (ft)	Length of Wall (ft)	Perimeter over 20 ft	Open space >20 ft
North	3	184	0	0
East	30	138	138	30
South	30	178	178	30
West	30	135	135	30
Values		P	F	W
		635	451	0

2.1b Allowable Building Area Calculation

Occupancy	A-2	R-1
Type of Construction	IA/VA	IA/VA
Tabular Area (Table 503)	11,500	12,000
Frontage (506.2)		
F	P	W/30
451	635	1.00
Sprinklers (506.3)	2	2
Area Per Story	39,793	41,523

2.1c Ratio Calculation per Section 506.5.2

Second level evaluated as a nonseparated use. Allowable area based on Group A-2 occupancy

	Story				
	1	2	3	4	5
Actual Area Per Story	24287	19881	20082	20118	20111
Allowable Area per Story	UL	39793	41523	41523	41523
Story Ratio	N/A	0.50	0.48	0.48	0.48
Building Ratio	1.95				OK!

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Incidental Use Areas

509

- Incidental uses located within single occupancy or mixed occupancy buildings shall comply with the provisions of this section. Incidental uses are ancillary functions associated with a given occupancy that generally pose a greater level of risk to that occupancy and are limited to those uses listed in Table 509.
- Exception: Incidental uses within and serving a dwelling unit are not required to comply with this section.



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**[F]TABLE 509.1
INCIDENTAL USES**

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In <i>ambulatory care facilities</i> , laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In ambulatory care facilities or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than ambulatory care facilities and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In ambulatory care facilities or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.

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Separation

509.4.1

- Where Table 509 specifies a fire-resistance-rated separation, the incidental uses shall be separated from the remainder of the building by a fire barrier or a horizontal assembly, or both.
- Construction supporting 1-hour fire barriers or horizontal assemblies used for incidental use separations in buildings of Type IIB, IIIB and VB construction is not required to be fire-resistance rated unless required by other sections of this code.



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Protection

509.4.2

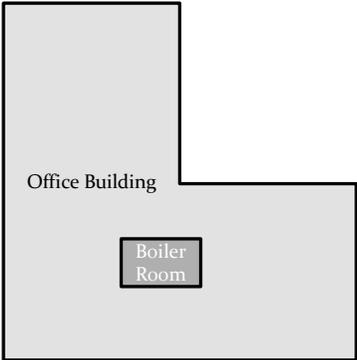


- Where Table 509 permits an automatic sprinkler system without a fire barrier, the incidental uses shall be separated from the remainder of the building by construction capable of resisting the passage of smoke.
- The walls shall extend from the top of the foundation or floor assembly below to the underside of the ceiling that is a component of a fire-resistance-rated floor assembly or roof assembly above or to the underside of the floor or roof sheathing, deck or slab above.

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Incidental Use Area Example



- Given:
 - Office Building
 - No fire sprinklers
 - Boiler room with 1,000,000 Btu Boiler
- Required
 - One-hour fire barrier separation
 - Limited to 10% of story

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Special Provisions

510.1

- The provisions in this section shall permit the use of special conditions that are exempt from, or modify, the specific requirements of this chapter regarding the allowable heights and areas of buildings based on the occupancy classification and type of construction, provided the special condition complies with the provisions specified in this section for such condition and other applicable requirements of this code.
- The provisions of Sections 510.2 through 510.8 are to be considered independent and separate from each other.



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Chapter 4 Special detailed requirements based on use and occupancy

- Covered Mall Buildings
- High-Rise Buildings
- Atriums
- Motor-Vehicle Occupancies
- Hazardous Occupancies
- Live-Work Units



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Atrium Notes Example



- Building is designed in accordance with Section 404 Atriums
 - Building will be fully sprinklered
 - Building will be provided with fire alarm
 - Atrium enclosure notes
 - Standby Power will be provided
 - Atrium interior finishes minimum Class B flame spread

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Fire-Resistance Rated Construction

- Type of Construction
- Occupancy Separations
- Fire Walls
- Special Occupancy Requirements



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Type of Construction Table 601

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV			HT	TYPE V	
	A	B	A	B	A	B	A	B	C		A	B
Primary structural frame ^a (see Section 202)	3 ^b	2 ^{b, c, d}	1 ^{b, c}	0 ^e	1 ^{b, c}	0	3 ^b	2 ^b	2 ^b	HT	1 ^{b, c}	0
Bearing walls												
Exterior ^{f, g}	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ^b	2 ^b	1	0	1	0	3	2	2	1/HT ^h	1	0
Nonbearing walls and partitions	See Table 705.5											
Exterior	See Table 705.5											
Interior ⁱ	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2 ^b	1 ^{b, c}	1 ^{b, c}	0 ^e	1 ^{b, c}	0	1 1/2	1	1	HT	1 ^{b, c}	0

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Type of Construction

2.2 Building Fire-Resistance

Type of Construction	IA	VA
Building Element	Fire-Resistive Rating (Table 601)	Fire-Resistive Rating (Table 601)
Structural Frame	3 hour	1 hour
Exterior Bearing Wall	3 hour	1 hour
Interior Bearing Wall	3 hour	1 hour
Permanent Partitions	non-rated	non-rated
Shaft Enclosures	2 hours	2 hours
Floors & Floor/Ceilings	2 hours	1 hour
Roofs & Roof/Ceilings	1 1/2 hours	1 hour

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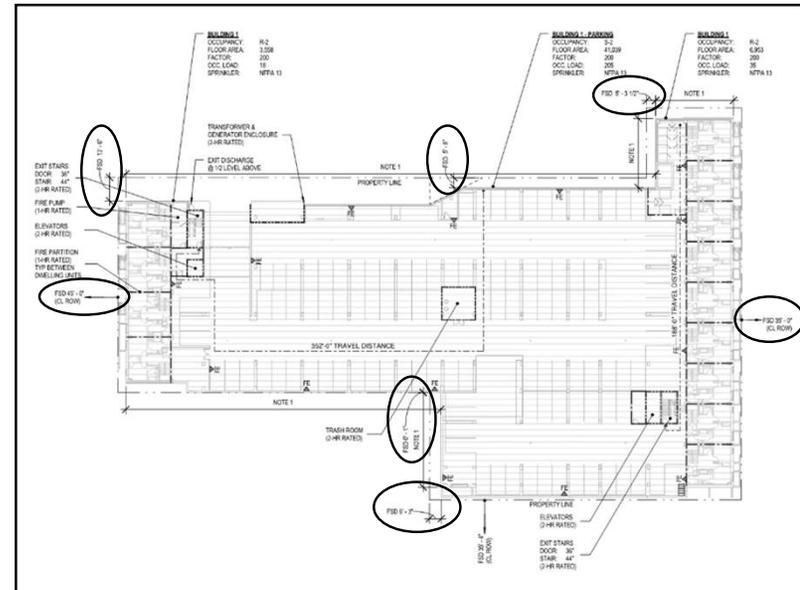
Exterior Wall Protection Table 705.8

**TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON
FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION**

FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA ^a
0 to less than 3 ^{b, c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S)	Not Permitted
	Protected (P)	Not Permitted
3 to less than 5 ^{b, c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, S)	15%
	Protected (P)	15%
5 to less than 10 ^{b, c, d}	Unprotected, Nonsprinklered (UP, NS)	10% ^b
	Unprotected, Sprinklered (UP, S)	25%
	Protected (P)	25%
10 to less than 15 ^{b, c, d}	Unprotected, Nonsprinklered (UP, NS)	15% ^b
	Unprotected, Sprinklered (UP, S)	45%
	Protected (P)	45%
15 to less than 20 ^{b, c, d}	Unprotected, Nonsprinklered (UP, NS)	25%
	Unprotected, Sprinklered (UP, S)	75%
	Protected (P)	75%
20 to less than 25 ^{b, c, d}	Unprotected, Nonsprinklered (UP, NS)	45%
	Unprotected, Sprinklered (UP, S)	No Limit
	Protected (P)	No Limit
25 to less than 30 ^{b, c, d}	Unprotected, Nonsprinklered (UP, NS)	70%
	Unprotected, Sprinklered (UP, S)	No Limit
	Protected (P)	No Limit
30 or greater	Unprotected, Nonsprinklered (UP, NS)	No Limit
	Unprotected, Sprinklered (UP, S)	No Limit
	Protected (P)	Not Required

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Exterior Wall Protection

2.3 Exterior Wall Protection and Openings

Location	Fire Separation	Exterior Bearing Wall	Exterior Non-Bearing	Opening Protection*
North	3 feet, 1 inch	1 hour	1 hour	15% UP
East	> 30 feet	1 hour	non-rated	UL, UP
South	> 30 feet	1 hour	non-rated	UL, UP
West	>30 feet	1 hour	non-rated	UL, UP

Section 704.8.1 used for unprotected openings in north wall
 * UP=Unprotected, P=Protected, UL=Unlimited

Additional Fire Assemblies

- Fire Walls
 - Rating
 - Continuity
 - Code reference
- Shafts
 - Rating
 - Top/bottom enclosures
 - Code reference
- Interior Exit Stairways
 - Ratings
 - Code reference

Assembly	Rating	Applicable IBC Section
Vertical shafts other than exit enclosures and elevator hoistway enclosures	1-hour	403.2.1.2
Elevator hoistway enclosures connecting 4 or more stories	2-hour	708.4
Elevator hoistway enclosures connecting less than 4 stories	2-hour	708.4
Exit stairway Enclosures connecting 4 or more stories	2-hour	1022.1
Exit stairway enclosures connecting less than 4 stories	1-hour	1022.1
Bottom enclosure of the shaft to match fire-resistance rating of lowest floor through which the shaft passes or terminate in a room with fire-resistance rating equal to the shaft enclosure		708.11
A shaft enclosure that does not extend to the underside of the roof deck or slab must be enclosed at the top with construction of the same fire-resistance rating as the topmost floor penetrated by the shaft, but not less than the fire-resistance rating required for the shaft enclosure.		708.12
Exit enclosures serving a floor more than 75 feet above the lowest fire department vehicle access must be a smokeproof enclosure or pressurized		1022.9 & 909.20

Fire Protection Requirements

Additional Fire Protection Requirements

IBC Section	Comment
403.3	Building shall be equipped throughout with an NFPA 13 automatic sprinkler system and secondary water supply as required by Section 903.3.5.2
420.2	Walls separating dwelling units in the same building and walls separating sleeping units in the same building shall comply
508.2.5	Fire Pump room is considered an incidental accessory occupancy. The room shall be separated from the remainder of the building by 2-hour fire-resistant rated construction.
911.1.2	The fire command center shall be separated from the remainder of the building by not less than a 1-hour fire-resistant rated construction.
3007.4	Fire service access elevator lobby provided between Stair #2 and elevators 1 & 2. 1-hour smoke barrier with 45 minute fire doors.

Means of Egress

- Occupant Load
- Number of exits or exit access doors
- Egress Width
 - Doors/Corridors
 - Stairs



Floor Area per Occupant Table 1004.1.2



**TABLE 1004.5
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT**

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR ^a
Accessory storage areas, mechanical equipment room	300 gross
Agricultural building	300 gross
Aircraft hangars	500 gross
Airport terminal	
Baggage claim	20 gross
Baggage handling	300 gross
Concourse	100 gross
Waiting areas	15 gross
Assembly	
Gaming floors (keno, slots, etc.)	11 gross
Exhibit gallery and museum	30 net
Assembly with fixed seats	See Section 1004.6
Assembly without fixed seats	
Concentrated (chairs only—not fixed)	7 net
Standing space	5 net
Unconcentrated (tables and chairs)	15 net
Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7 net
Business areas	150 gross
Concentrated business use areas	See Section 1004.8
Courtrooms—other than fixed seating areas	40 net

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Egress from spaces 1006.2

**TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY**

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)			
		Without Sprinkler System (feet)		With Sprinkler System (feet)	
		Occupant Load	Occupant Load	Occupant Load	Occupant Load
A ¹ , E, M	49	75	75	75 ^a	75 ^a
B	49	100	75	100 ^a	100 ^a
F	49	75	75	100 ^a	100 ^a
H.1, H.2, H.3	3	NP	NP	25 ^b	25 ^b
H.4, H.5	10	NP	NP	75 ^a	75 ^a
I.1, I.2 ^c , I.4	10	NP	NP	75 ^a	75 ^a
I.3	10	NP	NP	100 ^a	100 ^a
R-1	10	NP	NP	75 ^a	75 ^a
R-2	10	NP	NP	125 ^a	125 ^a
R-3 ^d	10	NP	NP	125 ^a	125 ^a
R-4 ^d	10	75	75	125 ^a	125 ^a
S ^e	29	100	75	100 ^a	100 ^a
U	49	100	75	75 ^a	75 ^a

- Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1.

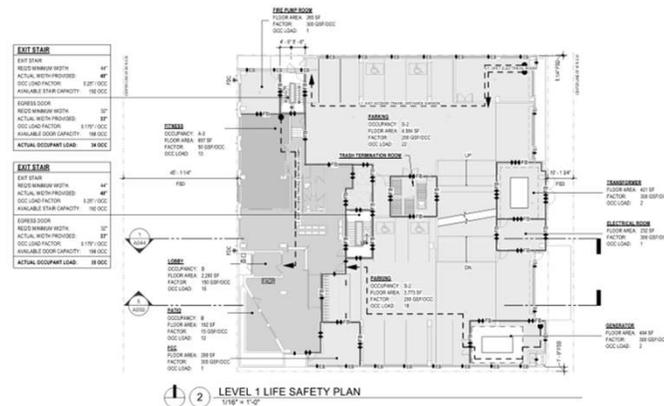
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Means of Egress

Occupant Load Calculation

Floor	Use	Occ Load Factor	Occupancy					
			S-2	R-2	A-3	B	M	
B2	Parking Garage	200	115	-	-	-	-	-
B1	Parking Garage	200	116	-	-	-	-	-
1	Mercantile	30	-	-	-	20	-	199
	Leasing/Common	100	-	-	-	-	-	-
	Garage/Loading	200	49	-	-	-	-	-
2	Parking Garage	200	110	-	-	-	-	-
3	Parking Garage	200	118	-	-	-	-	-
4	Parking Garage	200	66	-	-	-	-	-
5	Residential	200	-	82	-	-	-	-
	Occupied Roof	15	-	-	269	-	-	-
6	Residential	200	-	82	-	-	-	-
7	Residential	200	-	82	-	-	-	-
8	Residential	200	-	82	-	-	-	-
9	Residential	200	-	82	-	-	-	-
10	Residential	200	-	82	-	-	-	-
11	Residential	200	-	82	-	-	-	-
12	Residential	200	-	82	-	-	-	-
13	Residential	200	-	71	-	-	-	-
	Storage	200	12	-	-	-	-	-
14	Residential	200	-	43	-	-	-	-
	Assembly	15	-	-	173	-	-	-
	Pool	50	-	-	18	-	-	-
	Pool Deck	15	-	-	257	-	-	-

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Additional Egress Notes

- Common path of egress travel
- Travel distance
- Corridor Ratings
- Special conditions



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Exit Access Travel Distance Table 1016.2

- Exit access travel distance shall not exceed the values given in Table 1016.2.

**TABLE 1016.2
EXIT ACCESS TRAVEL DISTANCE***

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200	250 ^b
I-1	Not Permitted	250 ^c
B	200	300 ^c
F-2, S-2, U	300	400 ^c
H-1	Not Permitted	75 ^c
H-2	Not Permitted	100 ^c
H-3	Not Permitted	150 ^c
H-4	Not Permitted	175 ^c
H-5	Not Permitted	200 ^c
I-2, I-3, I-4	Not Permitted	200 ^c

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Corridor Construction 1018.1

- Corridors shall be fire-resistance rated in accordance with Table 1018.1
- The corridor walls required to be fire-resistance-rated shall comply with Section 709 for fire partitions.

**TABLE 1018.1
CORRIDOR FIRE-RESISTANCE RATING**

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system ^a
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	0.5
I-2, I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1 ^b

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Accessibility

- Number of Units
 - Accessible units
 - Type A units
 - Type B units
 - Option A or B
- Accessible parking
 - Number of total spaces
 - Number of accessible spaces



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Accessibility

VI. Accessibility

Type A & B Dwelling Units
based on IBC Section 1107.6.2

Dwelling Unit Type	Quantity Proposed	Type A Required	Type A Provided	Type B Required	Type B Provided
Studio	17		2		15
One Bedroom	200		2	all others	198
Two Bedroom	71		2		69
Total	288	0	6	282	282

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TABLE 403.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES^a
(See Sections 403.2 and 403.3)

NO.	CLASSIFICATION	OCCUPANCY	DESCRIPTION	WATER CLOSETS (URINALS SEE SECTION 419.2)		LAVATORIES		BATHTUBS/ SHOWERS	DRINKING FOUNTAIN ^b (SEE SECTION 410.1)	OTHER
				MALE	FEMALE	MALE	FEMALE			
1	Assembly	A-1 ^d	Theaters and other buildings for the performing arts and motion pictures	1 per 125	1 per 65	1 per 200	—	1 per 500	1 service sink	
		A-2 ^d	Nightclubs, bars, taverns, dance halls and buildings for similar purposes	1 per 40	1 per 40	1 per 75	—	1 per 500	1 service sink	
			Restaurants, banquet halls and food courts	1 per 75	1 per 75	1 per 200	—	1 per 500	1 service sink	
		A-3 ^d	Auditoriums without permanent seating, art galleries, exhibition halls, museums, lecture halls, libraries, arcades and gymnasiums	1 per 125	1 per 65	1 per 200	—	1 per 500	1 service sink	
			Passenger terminals and transportation facilities	1 per 500	1 per 500	1 per 750	—	1 per 1,000	1 service sink	
			Places of worship and other religious services.	1 per 150	1 per 75	1 per 200	—	1 per 1,000	1 service sink	

10,000 s.f. restaurant
Occupant load = 667
334 male, 334 female

5 Water Closets each
2 Lavatories each
1 drinking fountain
1 service sink

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Plumbing Fixtures

VII. Plumbing Fixtures

based on IBC Section 2902.1

Use	Occupant Load	WC Required		WC Provided		Lavatories Required	Lavatories Provided
		Male	Female	Male	Female		
M Mercantile	199	1	1	TBD	TBD	1 each	TBD
A-3 Assembly	744	3	5	5	10	2 each	2 each
R-2 Residential	N/A	1 per dwelling		1 per dwelling		1 per dwelling	1 per dwelling

¹ 1 automatic clothes washer connection per 20 units required - 15 connections required. One provided in each dwelling.

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Information on the Drawings

- Construction documents shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show in detail that it will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the building official.
- Floor plans
- Elevations
- Sections
- Details
- Structural plans
- Specifications
- Soils Reports
- Calculations

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Fire-Resistance Rated Construction



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ASTM E 119 or UL 263 Documentation



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Gypsum Association

- Gypsum Association
 - 6525 Belcrest Rd #480
 - Huntsville, MD 20782

Phone: 301-277-8686
 Fax: 303-277-8747

- www.gypsum.org



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Tables 720.1 footnotes

- Generic fire-resistance ratings (those not designated as PROPRIETARY* in the listing) in the GA 600 shall be accepted as if herein listed.

GA FILE NO. WP 3380	GENERIC	1 HOUR FIRE	40 to 44 STC SOUND
GYPSUM WALLBOARD, WOOD STUDS One layer 5/8" type X gypsum wallboard or gypsum veneer base applied parallel or at right angles to each side of 2 x 4 wood studs 16" o.c. staggered 5" o.c. on 2 x 6 wood plates with 6d coated nails, 1 1/4" long, 0.0915" shank, 1/4" heads, 7" o.c. Joints staggered 24" on opposite sides. Horizontal bracing required at mid-height. (LOAD-BEARING)			

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GA Proprietary Systems

- Where the word "proprietary" appears in system descriptions either the system or one or more of its components is considered proprietary.
- Each proprietary system shall be built utilizing the components specified by the company or companies listed under the detailed description for that system.
- All other systems are generic.
- Generic systems are applicable to the products of any manufacturer, whether a member of the gypsum association or not, provided the products meet the appropriate standards.

GA FILE NO. ASW 1501	PROPRIETARY*	2 HOUR FIRE
GYPSUM WALLBOARD, STEEL L, C-H OR C-T STUDS		
<p>One layer 1" x 24" proprietary type X gypsum panels inserted between 2 1/2" floor and ceiling runners with tab-flange section of 2 1/2" steel L, C-H or C-T studs between panels. One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied parallel to each side with 1" Type S drywall screws 12" o.c. (NLB)</p>		
<p>PROPRIETARY GYPSUM BOARD American Gypsum Company LLC</p>		
<p>5/8" FireBloc® Type X 1" Shaft Liner</p>		
<p>Thickness: 3/4" Approx. Weight: 9 psf Fire Test: UL R14196, 05NK29331, 2-19-06; UL R14196, 06NK09317, 4-11-06; UL Design V455</p>		

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Exterior Wall

GA FILE NO. WP 8105	GENERIC	1 HOUR FIRE
GYPSUM WALLBOARD, GYPSUM SHEATHING, WOOD STUDS		
<p>EXTERIOR SIDE: One layer 48" wide 5/8" type X gypsum sheathing applied parallel to 2 x 4 wood studs 24" o.c. with 1 1/4" galvanized roofing nails 4" o.c. at vertical joints and 7" o.c. at intermediate studs and top and bottom plates. Joints of gypsum sheathing may be left untreated. Exterior cladding to be attached through sheathing to studs.</p>		
<p>INTERIOR SIDE: One layer 5/8" type X gypsum wallboard, water-resistant gypsum backing board, or gypsum veneer base applied parallel or at right angles to studs with 6d coated nails, 17/8" long, 0.0915" shank, 1/4" heads, 7" o.c. (LOAD-BEARING)</p>		
<p>Thickness: Varies Approx. Weight: 7 psf Fire Test: See WP 3510 (UL R3501-47, -48, 9-17-65; UL Design U309; UL R1319-129, 7-22-70; UL Design U314)</p>		

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Exterior Wall

GA FILE NO. WP 8006	PROPRIETARY*	1 HOUR FIRE																								
GYPSUM WALLBOARD, GLASS MAT GYPSUM SUBSTRATE, STEEL STUDS, MINERAL OR GLASS FIBER INSULATION																										
<p>EXTERIOR SIDE: One layer 5/8" proprietary type X glass mat gypsum substrate (sheathing) applied parallel to 3 1/2" 20 gage steel studs 24" o.c. with 1" Type S-12, self-drilling, corrosion resistant, bugle head, drywall screws 12" o.c. Studs attached to both vertical logs of floor and ceiling runners either by welding or with 1/2" Type S-12 pan head screws. Mineral or glass fiber insulation friction fit into the stud space. Exterior cladding to be attached through glass mat gypsum panel to studs.</p>																										
<p>INTERIOR SIDE: One layer 5/8" proprietary type X gypsum board applied parallel to studs with 1" Type S-12 drywall screws 12" o.c.</p>																										
<p>Bracing: Lateral bracing spaced not over 40" o.c. shall be 1" by 18 gage steel straps attached to each side or channel bracing attached to each stud with a clip angle. For studs with holes or punch-outs in the web the "Q" factor shall be determined by means of stub column tests. Tested at 100 percent of design load. (LOAD-BEARING)</p>																										
<p>PROPRIETARY GYPSUM PANEL PRODUCTS</p> <table border="0"> <tr> <td>CertainTeed Gypsum Inc.</td> <td>-</td> <td>5/8" ProRoc® Type X Gypsum Panels</td> </tr> <tr> <td></td> <td>-</td> <td>5/8" GlasRoc® Sheathing Type X Gypsum Panels</td> </tr> <tr> <td>CertainTeed Gypsum Canada Inc.</td> <td>-</td> <td>5/8" ProRoc® Type X Gypsum Panels</td> </tr> <tr> <td>Georgia-Pacific Gypsum LLC</td> <td>-</td> <td>5/8" ToughRock® Fireguard®</td> </tr> <tr> <td></td> <td>-</td> <td>5/8" DensGlass Gold® Fireguard®</td> </tr> <tr> <td>National Gypsum Company</td> <td>-</td> <td>5/8" eXP® FIRE-SHIELD® Gypsum Sheathing</td> </tr> <tr> <td></td> <td>-</td> <td>5/8" Gold Bond® Brand FIRE-SHIELD® Gypsum Board</td> </tr> <tr> <td>Temple-Inland</td> <td>-</td> <td>5/8" GreenGlass Type X 5/8" Type X</td> </tr> </table>			CertainTeed Gypsum Inc.	-	5/8" ProRoc® Type X Gypsum Panels		-	5/8" GlasRoc® Sheathing Type X Gypsum Panels	CertainTeed Gypsum Canada Inc.	-	5/8" ProRoc® Type X Gypsum Panels	Georgia-Pacific Gypsum LLC	-	5/8" ToughRock® Fireguard®		-	5/8" DensGlass Gold® Fireguard®	National Gypsum Company	-	5/8" eXP® FIRE-SHIELD® Gypsum Sheathing		-	5/8" Gold Bond® Brand FIRE-SHIELD® Gypsum Board	Temple-Inland	-	5/8" GreenGlass Type X 5/8" Type X
CertainTeed Gypsum Inc.	-	5/8" ProRoc® Type X Gypsum Panels																								
	-	5/8" GlasRoc® Sheathing Type X Gypsum Panels																								
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	-	5/8" DensGlass Gold® Fireguard®																								
National Gypsum Company	-	5/8" eXP® FIRE-SHIELD® Gypsum Sheathing																								
	-	5/8" Gold Bond® Brand FIRE-SHIELD® Gypsum Board																								
Temple-Inland	-	5/8" GreenGlass Type X 5/8" Type X																								
<p>Thickness: 4 1/4" Approx. Weight: 6 psf Fire Test: UL R3660/R15187, 01NK21103, 2-4-02; ULR6937, 07NK08079, 9-19-08; UL Design U425</p>																										

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Townhouse Common Wall

AREA SEPARATION WALLS			
GA FILE NO. ASW 1000	PROPRIETARY*	2 HOUR FIRE	60 to 64 STC SOUND
GYPSUM WALLBOARD, STEEL H STUDS			
<p>Two layers 1" x 24" proprietary type X gypsum panels inserted between 2" floor and ceiling runners with 2" steel H studs between adjacent pairs of gypsum panels.</p>			
<p>A 3/4" minimum air space must be maintained between steel components and adjacent framing (as indicated by dashed lines in sketch). As an alternate to an air space, the steel components are covered with 6" wide battens of 1/2" gypsum board or 1" mineral fiber insulation. As an alternate to battens, one or both faces of the separation wall are covered with 1" mineral fiber insulation stapled to the gypsum liner panels or 1/2" regular gypsum board screw attached to the steel components.</p>			
<p>Sound tested with 2 x 4 stud wall faced with 1/2" regular gypsum wallboard each side of assembly and 3" mineral fiber in stud space on both sides. (NLB)</p>			
<p>PROPRIETARY GYPSUM BOARD United States Gypsum Company</p>			
<p>1" SHEETROCK® Liner Panels</p>			
<p>Thickness: 3/2" Limiting Height: Refer to manufacturer Approx. Weight: 9 psf Fire Test: UL R1319, 89NK28786, 5-14-00; UL Design U336 Sound Test: RAL TL88-350, 9-12-88</p>			

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I-Joist Floor System

GA FILE NO. FC 5407	GENERIC	1 HOUR FIRE	35 to 39 STC SOUND
WOOD I-JOISTS, GYPSUM WALLBOARD			
<p>Base layer 5/8" type X gypsum wallboard applied at right angles to wood I-joists 24" o.c. with 1 1/4" Type W or S drywall screws 24" o.c. Face layer 5/8" type X gypsum wallboard or gypsum veneer base applied at right angles to I-joists with 1 7/8" Type W or S drywall screws 12" o.c. at joints and intermediate I-joists and 1 1/2" Type G drywall screws 12" o.c. placed 2" back on either side of end joints. Joints offset 24" from base layer joints. Wood I-joists supporting 1/2" wood structural panels applied at right angles to joists with 8d nails.</p>			
		<p>Approx. Ceiling Weight: 5 psf Fire Test: FM FC 172, 2-25-72; ITS, 8-6-98 Sound Test: Estimated</p>	

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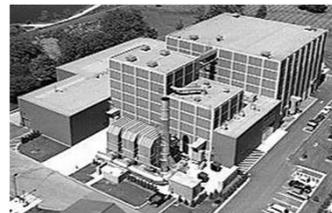
Truss Roof-Ceiling

GA FILE NO. RC 2603	PROPRIETARY*	1 HOUR FIRE
WOOD ROOF TRUSSES, RESILIENT CHANNELS, GLASS OR MINERAL FIBER INSULATION, CEILING DAMPER, GYPSUM WALLBOARD		
<p>One layer 5/8" proprietary type X gypsum wallboard or gypsum veneer base applied at right angles to resilient furring channels 12" o.c. with 1 1/8" Type S drywall screws 8" o.c. Gypsum board end joints attached with screws 8" o.c. to additional pieces of channel 60" long located 3" back on either side of end joint. Resilient channels applied at right angles to bottom chord of pitched wood trusses 24" o.c. with 1 1/4" Type S or W screws. Glass fiber or mineral fiber batt or loose fill insulation applied directly over gypsum board. Trusses supporting 1/2" plywood or OSB roof sheathing applied at right angles to trusses with construction adhesive and 6d ring shank nails 12" o.c. Optional ceiling damper (refer to manufacturer for information on the type of damper).</p>		
PROPRIETARY GYPSUM BOARD		
<p>National Gypsum Company - 5/8" Gold Bond® Brand FIRE-SHIELD™ Gypsum Board</p>		
		<p>Approx. Ceiling Weight: 3 psf Fire Test: UL R3501, 00NK42686, 8-16-01, UL Design P533</p>

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III. Fire Resistance Directory

NUMBERING SYSTEM FOR FIRE RATED ASSEMBLIES

Groups of Construction	TYPES OF PROTECTION						700-999	900-999		
	Membrane Protection			Direct Applied Protection						
	000-099	100-199	200-299	300-399	400-499	500-599				
Floors-Ceilings A, B*, or C* Concrete and Cellular Steel Floor	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscellaneous	SFRM +	Unprotected	
D, E*, or F* Concrete and Steel Floor Units	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected	
G, H*, or I* Concrete and Steel Joists	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscellaneous	SFRM +	Unprotected	
J or K Concrete	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscellaneous	SFRM +	Unprotected	
L or M* Wood Joist or Combination Wood and Steel Assemblies	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscellaneous	SFRM +	Unprotected	
Beams: N or O* for Floor Ceiling	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Batts and Blankets or Mineral and Fiber Boards	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected
Roof-Ceilings: P, Q* or R*	Concealed Grid Sys.	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Miscellaneous	SFRM +	Unprotected	
Beams: S or T* Roof-Ceiling	Building Units	(Reserved)	Exposed Grid System	(Reserved)	Metal Lath	Gypsum Board	Mastic Coating	SFRM +	Unprotected	
Wall & Partition: U, V or W*	Block or Partition Panel Units	(Reserved)	Insulating Concrete	Wood Stud Gypsum Bd Lath &/or Plaster	Metal Stud Gypsum Bd Lath &/or Plaster	Misc.	Metal Panels Gypsum Bd Lath &/or Plaster	SFRM +	Masonry	
Columns: X, Y or Z*	Building Units	Prefabricated	(Reserved)	Batts and Blankets or Mineral and Fiber Boards	Metal Lath & Plaster	Gypsum Board	Mastic Coating	SFRM +	(Reserved)	

The prefix numbers with an asterisk (*) and the design numbers indicated as "Reserved" in the above table are for future expansion and to cater to new types of systems developed in the future.

UL V401, 1 hr. nonbearing

- Floor and Ceiling Runners** Steel channels, 1 in. deep by 2-1/2 in. wide, fabricated from No. 25 MSG galv steel, attached to concrete or masonry with fasteners 24 in. on centers.
- Steel Studs** 2-1/2 in. wide with 1-3/8 in. legs, 1/4 in. flange in legs, fabricated from No. 25 ga galv steel, 1-1/2 in. wide by 1-3/4 in. high conduit cutouts spaced 24 in. OC. Studs 1/2 in. less in length than assembly height.
- Gypsum Board*** 1/2 in. thick, paper or vinyl surfaced. Wallboard sheets applied vertically or horizontally with vertical joints located over studs attached to studs with 1 in. self-drilling, self-tapping steel screws located 12 in. OC in the field and 8 in. OC at joints. Joints covered with paper tape and joint compound. Exposed screw heads covered with joint compound. **NATIONAL GYPSUM CO** — Types FSW-1, FSW-G and FSW-C.
- Batts and Blankets*** 2 in. thick batts, supplied in 24 in. widths, placed to fill interior of wall. Any mineral wool batt bearing the UL Classification Marking as to Fire Resistance. See Batts and Blankets (BZJZ) Category For Names of Classified Companies.
- 4A. Fiber, Sprayed*** As an alternate to Batts and Blankets (Item 4) — Spray applied cellulose insulation material. The fiber is applied with water to completely fill the enclosed cavity in accordance with the application instructions supplied with the product. Nominal dry density of 3.0 lb/ft³. **U S GREENFIBER L L C** — Cocoon stabilized cellulose insulation.

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Design No. U336
Exposed to fire from separation Wall side only
Nonbearing Wall Rating — 2 Hr
Finish Rating — 120 Min

SECTION A-A
SECTION B-B
CONFIGURATION A
EXPOSED TO FIRE FROM AREA SEPARATION WALL SIDE ONLY

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Prescriptive Fire Resistance

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- The provisions of this section contain prescriptive details of fire-resistance-rated building elements, components or assemblies.
- The materials of construction listed in Table 720.1(1), Table 720.1(2), and Table 720.1(3) shall be assumed to have the fire-resistance ratings prescribed therein.
- Where materials that change the capacity for heat dissipation are incorporated into a fire-resistance-rated assembly, fire test results or other substantiating data shall be made available to show that the required fire-resistance rating time period is not reduced.

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Table 721.1(1)

TABLE 720.1(1)
MINIMUM PROTECTION OF STRUCTURAL PARTS BASED ON TIME PERIODS
FOR VARIOUS NONCOMBUSTIBLE INSULATING MATERIALS^a

STRUCTURAL PARTS TO BE PROTECTED	ITEM NUMBER	INSULATING MATERIAL USED	MINIMUM THICKNESS OF INSULATING MATERIAL FOR THE FOLLOWING FIRE-RESISTANCE PERIODS (inches)			
			4 hour	3 hour	2 hour	1 hour
	1-1.1	Carbonate, lightweight and sand-lightweight aggregate concrete, members 6" × 6" or greater (not including sandstone, granite and siliceous gravel). ^a	2½	2	1½	1
	1-1.2	Carbonate, lightweight and sand-lightweight aggregate concrete, members 8" × 8" or greater (not including sandstone, granite and siliceous gravel). ^a	2	1½	1	1
	1-1.3	Carbonate, lightweight and sand-lightweight aggregate concrete, members 12" × 12" or greater (not including sandstone, granite and siliceous gravel). ^a	1½	1	1	1
	1-1.4	Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 6" × 6" or greater. ^a	3	2	1½	1
	1-1.5	Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 8" × 8" or greater. ^a	2½	2	1	1
	1-1.6	Siliceous aggregate concrete and concrete excluded in Item 1-1.1, members 12" × 12" or greater. ^a	2	1	1	1

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Table 721.1(2)

TABLE 720.1(2)—continued
RATED FIRE-RESISTANCE PERIODS FOR VARIOUS WALLS AND PARTITIONS^{a,b,c}

STRUCTURAL PARTS TO BE PROTECTED	ITEM NUMBER	CONSTRUCTION	RATED FIRE-RESISTANCE PERIODS (hours)			
			4	3	2	1
13. Noncombustible studs—interior partition with gypsum wallboard each side	13-1.1	0.018" (No. 25 carbon sheet steel gage) channel-shaped studs 24" on center with one full-length layer of ½" Type X gypsum wallboard ^d applied vertically attached with 1" long No. 6 drywall screws to each stud. Screws are 8" on center around the perimeter and 12" on center on the intermediate stud. The wallboard may be applied horizontally when attached to 3½" studs and the horizontal joints are staggered with those on the opposite side. Screws for the horizontal application shall be 8" on center at vertical edges and 12" on center at intermediate studs.	—	—	—	2½ ^d
	13-1.2	0.018" (No. 25 carbon sheet steel gage) channel-shaped studs 25" on center with two full-length layers of ½" Type X gypsum wallboard ^d applied vertically each side. First layer attached with 1" long, No. 6 drywall screws, 8" on center around the perimeter and 12" on center on the intermediate stud. Second layer applied with vertical joints offset one stud space from first layer using 1½" long, No. 6 drywall screws spaced 9" on center along vertical joints, 12" on center at intermediate studs and 24" on center along top and bottom runners.	—	—	3½ ^d	—
	13-1.3	0.055" (No. 16 carbon sheet steel gage) approved available metal studs 24" on center with full-length ½" Type X gypsum wallboard ^d applied vertically and nailed 7" on center with 6d cement-coated common nails. Approved metal fastener grips used with nails at vertical butt joints along studs.	—	—	—	4½

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Table 721.1(3)

TABLE 720.1(3)—continued
MINIMUM PROTECTION FOR FLOOR AND ROOF SYSTEMS^{a,c}

FLOOR OR ROOF CONSTRUCTION	ITEM NUMBER	CEILING CONSTRUCTION	THICKNESS OF FLOOR OR ROOF SLAB (inches)				MINIMUM THICKNESS OF CEILING (inches)			
			4 hour	3 hour	2 hour	1 hour	4 hour	3 hour	2 hour	1 hour
24. Wood I-joint (minimum I-joint depth 9½" with a minimum flange depth of 1½" and a minimum flange cross-sectional area of 5.25 square inches; minimum web thickness of 3/8") @ 24" o.c., 1½" mineral wool insulation (2.5 pcf—nominal) resting on hat-shaped furring channels.	24-1.1	Minimum 0.026" thick hat-shaped channel 16" o.c. (channels doubled at wallboard end joints), placed perpendicular to the joist and attached to each joist by 1½" Type S drywall screws, 5/8" Type C gypsum wallboard applied perpendicular to the channel with end joints staggered and fastened with 1½" Type S drywall screws spaced 12" o.c. in the field and 8" o.c. at the wallboard ends. Wallboard joints to be taped and covered with joint compound.	—	—	—	Varies	—	—	—	5/8

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Calculated Fire Resistance

722

- The provisions of this section contain procedures by which the fire resistance of specific materials or combinations of materials is established by calculations.
- These procedures apply only to the information contained in this section and shall not be otherwise used. The calculated fire resistance of specific materials or combinations of materials shall be established by one of the following:
 - Concrete, concrete masonry and clay masonry assemblies shall be permitted in accordance with ACI 216.1/TMS 0216.
 - Precast and precast, prestressed concrete assemblies shall be permitted in accordance with PCI 124.
 - Steel assemblies shall be permitted in accordance with Chapter 5 of ASCE 29.
 - Exposed wood members and wood decking shall be permitted in accordance with Chapter 16 of ANSI/AWC NDS.

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Fire-Resistance Rating of Structural Members – 704.1

- The fire-resistance ratings of structural members and assemblies shall comply with this section and the requirements for the type of construction as specified in Table 601. The fire-resistance ratings shall not be less than the ratings required for the fire-resistance-rated assemblies supported by the structural members.
 - Exception: Fire barriers, fire partitions, smoke barriers and horizontal assemblies as provided in Sections 707.5, 709.4, 710.4 and 712.4, respectively.



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Table 601

**TABLE 601
FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS)**

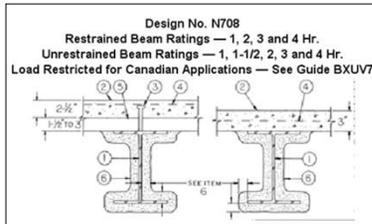
BUILDING ELEMENT	TYPE I		TYPE II		TYPE III		TYPE IV				TYPE V	
	A	B	A	B	A	B	A	B	C	HT	A	B
Primary structural frame ^a (see Section 202)	3 ^{b,k}	2 ^{b,k,c}	1 ^{b,c}	0 ^f	1 ^{b,c}	0	3 ⁱ	2 ⁱ	2 ⁱ	HT	1 ^{b,c}	0
Bearing walls												
Exterior ^f	3	2	1	0	2	2	3	2	2	2	1	0
Interior	3 ⁱ	2 ⁱ	1	0	1	0	3	2	2	1/HT ^g	1	0
Nonbearing walls and partitions	See Table 705.5											
Exterior												
Nonbearing walls and partitions Interior ^f	0	0	0	0	0	0	0	0	0	See Section 2304.11.2	0	0
Floor construction and associated secondary structural members (see Section 202)	2	2	1	0	1	0	2	2	2	HT	1	0
Roof construction and associated secondary structural members (see Section 202)	1 1/2 ^h	1 ^{b,c}	1 ^{b,c}	0 ^f	1 ^{b,c}	0	1 1/2	1	1	HT	1 ^{b,c}	0

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UL Listings



- Steel Beam — W8x28 min size.
- Normal Weight or Lightweight Concrete — Compressive strength, 3000 psi.
- Shear Connector — (Optional) — Studs, 3/4 in. diam headed type or equivalent per AISC specifications. Welded to the top flange of beam through the steel floor units.
- Welded Wire Fabric — (Optional) — 6x6-10/10 SWG.
- Steel Floor and Form Units* — 1-5/16 in. deep corrugated units; or 1-1/2 to 3 in. deep fluted or cellular units, welded to beam.

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Sprayed Fire-resistant Materials

- Spray-Applied Fire Resistant Materials* — Applied by mixing with water and spraying in more than one coat to the beam to the final thicknesses shown below.
- When fluted or corrugated steel floor units are used, crest areas shall be filled with Spray-Applied Fire Resistant Materials above the beam.
- Beam surfaces must be clean and free of dirt, loose scale and oil. Min avg and min ind density of 15/14 pcf respectively.

Rating Hr	Restrained Beam Rating Hr	Unrestrained Beam Rating Hr
1	1/2	1/2
1 1/2	11/16	13/16
2	15/16	1-1/16
3	1-7/16	1-9/16
4	1-15/16	2

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Sprayed Fire-resistant Materials - 1704.12

- Special inspections for sprayed fire-resistant materials applied to structural elements and decks shall be in accordance with Sections 1704.12.1 through 1704.12.6.
- Special inspections shall be based on the fire-resistance design as designated in the approved construction documents.



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Exterior Walls

705

- Exterior walls shall be fire-resistance rated and have opening protection as required by this section.



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Exterior Walls - Projections

705.2

TABLE 705.2
MINIMUM DISTANCE OF PROJECTION

FIRE SEPARATION DISTANCE (FSD) (feet)	MINIMUM DISTANCE FROM LINE USED TO DETERMINE FSD
0 to less than 2	Projections not permitted
2 to less than 3	24 inches
3 to less than 5	Two-thirds of FSD
5 or greater	40 inches

- Cornices, eave overhangs, exterior balconies and similar projections extending beyond the exterior wall shall conform to the requirements of this section and Section 1405.
- Exterior egress balconies and exterior exit stairways and ramps shall comply with Sections 1021 and 1027, respectively.
- Projections shall not extend any closer to the line used to determine the fire separation distance than shown in Table 705.2.

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Exterior Wall Fire Ratings

705.5

- Exterior walls shall be fire-resistance rated in accordance with Table 601, based on the type of construction, and Table 705.5, based on the fire separation distance.

TABLE 705.5
FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE^{a, b, c}

FIRE SEPARATION DISTANCE = X (feet)	TYPE OF CONSTRUCTION	OCCUPANCY GROUP H ^d	OCCUPANCY GROUP F-1, M, S-1 ^e	OCCUPANCY GROUP A, B, E, F-2, I, R ^f , S-2, U ^g
X < 5 ^h	All	3	2	1
	IA, IVA	3	2	1
5 ≤ X < 10	Others	2	1	1
	IA, IB, IVA, IVB	2	1	1 ⁱ
10 ≤ X < 30	IIB, VIB	1	0	0
	Others	1	1	1 ⁱ
	All	0	0	0

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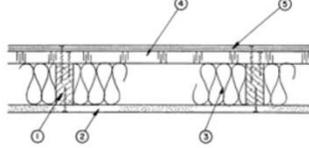
Exterior Wall Fire Ratings

705.5

Fire separation < 10 feet
fire exposure both sides

Fire separation > 10 feet
fire exposure from inside

Design No. U330
(Exposed to Fire on Interior Face Only)
Bearing Wall Rating — 1 HR.
Load Restricted for Canadian Applications — See Guide BXUV7



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TABLE 705.8
MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION

FIRE SEPARATION DISTANCE (feet)	DEGREE OF OPENING PROTECTION	ALLOWABLE AREA*
0 to less than 3 ^{A,c}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, SP)	Not Permitted
	Protected (P)	Not Permitted
3 to less than 5 ^{A,e}	Unprotected, Nonsprinklered (UP, NS)	Not Permitted
	Unprotected, Sprinklered (UP, SP)	15%
	Protected (P)	15%
5 to less than 10 ^{A,f}	Unprotected, Nonsprinklered (UP, NS)	10% ^A
	Unprotected, Sprinklered (UP, SP)	25%
	Protected (P)	25%
10 to less than 15 ^{A,g}	Unprotected, Nonsprinklered (UP, NS)	15% ^A
	Unprotected, Sprinklered (UP, SP)	45%
	Protected (P)	45%
15 to less than 20 ^{A,h}	Unprotected, Nonsprinklered (UP, NS)	25%
	Unprotected, Sprinklered (UP, SP)	75%
	Protected (P)	75%
20 to less than 25 ^{A,h}	Unprotected, Nonsprinklered (UP, NS)	45%
	Unprotected, Sprinklered (UP, SP)	No Limit
	Protected (P)	No Limit
25 to less than 30 ^{A,h}	Unprotected, Nonsprinklered (UP, NS)	70%
	Unprotected, Sprinklered (UP, SP)	No Limit
	Protected (P)	No Limit
30 or greater	Unprotected, Nonsprinklered (UP, NS)	No Limit
	Unprotected, Sprinklered (UP, SP)	Not Required
	Protected (P)	Not Required

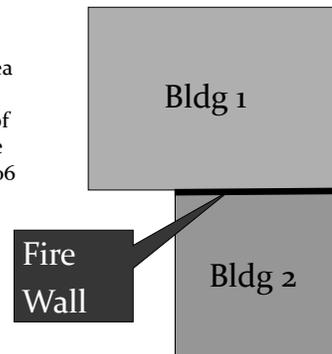
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Fire Walls

503.1

- For the purposes of determining area limitations, height limitations and type of construction, each portion of a building separated by one or more fire walls complying with Section 706 shall be considered to be a separate building.



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Structural Stability

706.2

- Fire walls shall be designed and constructed to allow collapse of the structure on either side without collapse of the wall under fire conditions.
- Fire walls designed and constructed in accordance with NFPA 221 shall be deemed to comply with this section.



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Fire Resistance Rating Table 706.4

**TABLE 706.4
FIRE WALL FIRE-RESISTANCE RATINGS**

GROUP	FIRE-RESISTANCE RATING (hours)
A, B, E, H-4, I, R-1, R-2, U	3 ^a
F-1, H-3 ^b , H-5, M, S-1	3
H-1, H-2	4 ^b
F-2, S-2, R-3, R-4	2

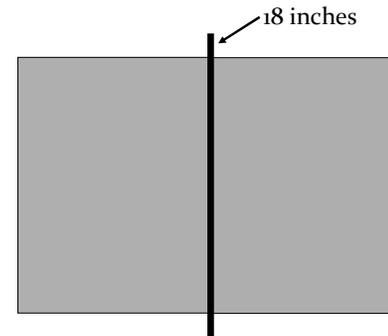
- a. In Type II or V construction, walls shall be permitted to have a 2-hour fire-resistance rating.
- b. For Group H-1, H-2 or H-3 buildings, also see Sections 415.4 and 415.5.

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Horizontal Continuity 706.5



- Fire walls shall be continuous from exterior wall to exterior wall and shall extend at least 18 inches beyond the exterior surface of exterior walls.

- Exceptions!

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Fire Barriers 707



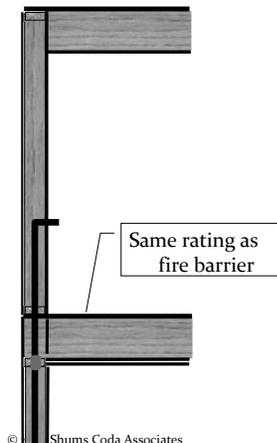
- Shaft Enclosures
- Exit enclosures 1019.1
- Exit passageways 1020.1
- Horizontal exits 1021.1
- Atrium Separations 404.5
- Incidental use areas 508.2
- Control Areas 414.2.3
- Separation of mixed occupancies 302.3.3
- Single-occupancy fire areas

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Fire Barrier Continuity 707.5



- Fire barriers shall extend from the top of the floor/ceiling assembly below to the underside of the floor sheathing, slab or deck above
- Continuous through concealed spaces such as suspended ceilings

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Supporting construction

707.5.1

- The supporting construction for a fire barrier shall be protected to afford the required fire-resistance rating of the fire barrier supported.
 - Hollow vertical spaces within a fire barrier shall be fireblocked in accordance with Section 717.2 at every floor level.
- Exceptions:
- Fire barriers separating tank storage as provided for in Section 415.6.2.1 shall be a maximum of 2 hours, but not less than required by Table 601
 - Shaft enclosures permitted to terminate at a top enclosure per Section 708.12.
 - Supporting construction for 1-hour fire barriers required by Table 508.2.5 in buildings of Type IIB, IIIB and VB construction are not required to be fire-resistance rated unless required by other sections of this code.

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Fire Partitions

708



- Dwelling separations
- Sleeping unit separations
- Tenant separations in mall buildings
- Corridor walls
- Elevator lobby separations
- One-hour FRR
- Continuity

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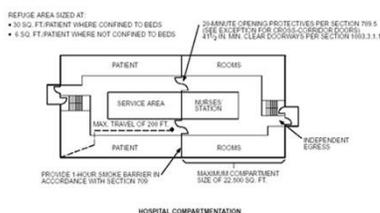
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Smoke Barriers

709

- 1-hour fire-resistance rated
- Continuous from outside wall to outside wall and slab to underside of floor/roof deck above
- Supporting structure, the same
- 20-minute opening protectives (716)
 - 1-2 occupancies where doors are installed across the corridors
 - 1-2, horizontal sliding doors per Section 1008.1.4.3



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Smoke Partitions

710

- Glass atrium separation
- I-2 corridor walls
- Elevator lobbies in sprinklered buildings



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Horizontal Assemblies

711

- Floor and roof assemblies required to have a fire-resistance rating



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Fire Resistance Rating

711.2.4

- Type of Construction
- Type of Separation
- I-1, R-1, R-2
 - One-hour fire-resistive



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712 – Vertical Openings



Ten Story Stacked Openings !

- The provisions of this section shall apply to the vertical opening applications listed in Sections 712.1.1 through 712.1.16.
- 16 options to address vertical openings

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712 – Vertical Openings



- Should always be referenced first.
- Contains the former “shaft exceptions” in its scoping requirements
 - Escalator
 - Atrium
 - Two-story opening

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Fire-Resistance Rating

713.4



- Four stories or more
 - two-hour
- Less than four stories
 - one-hour
- Includes basements, but not mezzanines
- Not less than the floor assembly penetrated, but need not exceed 2 hours
- Fire Barrier/Horizontal Assembly

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Penetrations

714.1

- The provisions of this section shall govern the materials and methods of construction used to protect through penetrations and membrane penetrations

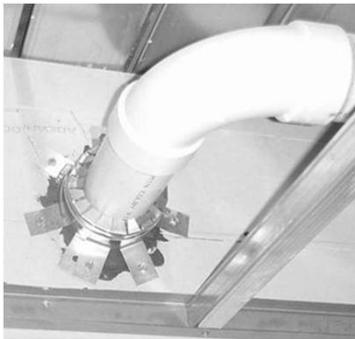


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Fire-Resistance-Rated Walls 714.3



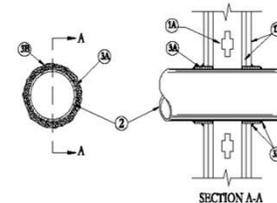
- Penetrations into or through
 - fire walls
 - fire barriers
 - smoke barrier walls
 - Must also comply with 713-5
 - fire partitions

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System No. W-L-2003
July 09, 2003
(Formerly System No. 143)
F Ratings - 1 and 2 Hr (See Item 3)
T Ratings - 1 and 2 Hr (See Item 3)
I Rating At Ambient - 7 C/Msq ft (See Item 3B)
I Rating At 400 F - less than 1 C/Msq ft (See Item 3B)



3. Firestop System - Installed symmetrically on both sides of wall assembly. The hourly F and T Ratings for the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed. The details of the firestop system shall be as follows:
 - A. **FIR, Void or Cavity Materials* - Wrap Strip** - Nom 1/4 in. (6 mm) thick intumescent elastomeric material faced on one side with aluminum foil, applied as 2 in. (51 mm) wide strips. Nom 2 in. (51 mm) wide strip tightly wrapped around nonmetallic pipe (oil side out with seam backed). Wrap strip layer securely bonded with steel wire or aluminum foil tape and laid into annular space approx 1-1/4 in. (32 mm) such that approx 3/4 in. (16 mm) of the wrap strip protrudes from the wall surface.
3M COMPANY - FS-100-
 - B. **FIR, Void or Cavity Materials* - Caulk or Putty** - Min 5/8 in. (16 mm) thickness of caulk or putty applied into annular space between wrap strip and periphery of opening. A nom 1/4 in. (6 mm) diam bead of caulk or putty to be applied to the wrap strip/wall interface and to the exposed edge of the wrap strip layers approx 3/4 in. (19 mm) from the wall surface.
3M COMPANY - CP-25WB-, IC-15WB, FD-150- caulk or MP- S6A putty
(Note: I Ratings apply only when CP-25WB- caulk is used.)
 - C. **Foil Tape (not shown)** - Nom 4 in. (102 mm) wide, 3 mil thick aluminum tape wrapped around pipe prior to the installation of the wrap strip (Item 3A). Min of one wrap, flush with both sides of wall and protruding outward. Tape is not required for pipes shown in Items 2A, 2B and 2C.

*Bearing the UL Classification Marking
This material was extracted and drawn by 3M Fire Protection Products from the 2003 edition of the UL Fire Resistance Directory.
3M Fire Protection Products
www.3m.com/firestop

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AUTOMAX: US or Canada: 1-800-498-9543
Customer Service: US or Canada: 1-800-328-1647

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Fire-Resistant Joint System

715

- Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system designed to resist the passage of fire for a time period not less than the required fire-resistance rating of the wall, floor or roof in or between which the system is installed.

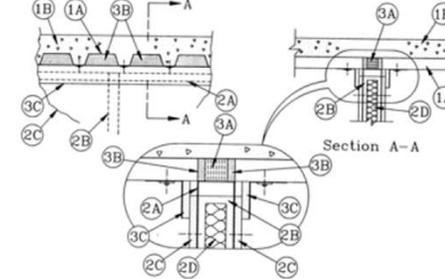


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System No. HW-D-0001
 Assembly Rating — 1 Hr
 Nominal Joint Width — 5/8 in.
 Class II and III Movement Capabilities— 100% Compression, 60% Extension



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716.5 – Opening Protection

TABLE 716.5(1)
 OPENING FIRE PROTECTION ASSEMBLIES, RATINGS AND MARKINGS

TYPE OF ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE DOOR AND FIRE SHUTTER ASSEMBLY RATING (hours)	DOOR VISION PANEL SIZE*	FIRE-RATED GLAZING MARKING PANEL**		MINIMUM SEGLIGHT/TRANSOM ASSEMBLY RATING (hours)		FIRE-RATED GLAZING MARKING PANEL (GLAZING/TRANSOM PANEL)	
				Fire protection	Fire resistance	Fire protection	Fire resistance	Fire protection	Fire resistance
Fire walls and fire barriers having a required fire resistance rating greater than 1 hour	4	3	See Note a	D-H-W-240	Not Permitted	4	Not Permitted	W-240	
	3	3 ¹ / ₂	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180	
	2	1 ¹ / ₂	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120	
	1 ¹ / ₂	1 ¹ / ₂	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	1 ¹ / ₂	Not Permitted	W-90	
Double fire walls constructed in accordance with NFPA 221	4	3	3	See Note a	D-H-W-180	Not Permitted	3	Not Permitted	W-180
	3	2	1 ¹ / ₂	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-W-90	Not Permitted	2	Not Permitted	W-120
	2	1	1	100 sq. in.	≤100 sq. in. = D-H-60 >100 sq. in. = D-H-W-60	Not Permitted	1	Not Permitted	W-60
	Enclosures for shafts, interior exit stairways and interior exit ramps	2	1 ¹ / ₂	100 sq. in.	≤100 sq. in. = D-H-90 >100 sq. in. = D-H-T-W-90	Not Permitted	2	Not Permitted	W-120

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716.6 – Glazing

TABLE 716.6(1)
 FIRE WINDOW ASSEMBLY FIRE PROTECTION RATINGS

TYPE OF WALL ASSEMBLY	REQUIRED WALL ASSEMBLY RATING (hours)	MINIMUM FIRE WINDOW ASSEMBLY RATING (hours)	FIRE-RATED GLAZING MARKING
Interior walls			
Fire walls	All	NP*	W-XXX*
Fire barriers	>1	NP*	W-XXX*
	1	NP*	W-XXX*
Atrium separations (Section 707.3.6), Incidental use areas (Section 707.3.7), Mixed occupancy separations (Section 707.3.9)	1	1/2	OH-45 or W-60
Fire partitions	1	1/2	OH-45 or W-60
Smoke barriers	0.5	1/2	OH-20 or W-30
	1	1/2	OH-45 or W-60
Exterior walls	>1	1/2	OH-90 or W-XXX*
	0.5	1/3	OH-45 or W-60
Party wall	All	NP	Not Applicable

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Draftstopping In Floors 718.3

- In combustible construction, draftstopping shall be installed to subdivide floor/ceiling assemblies

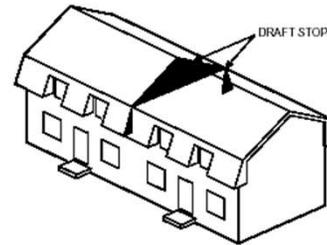


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Draftstopping In Attics 718.4



- In combustible construction, draftstopping shall be installed to subdivide attic spaces and concealed roof spaces

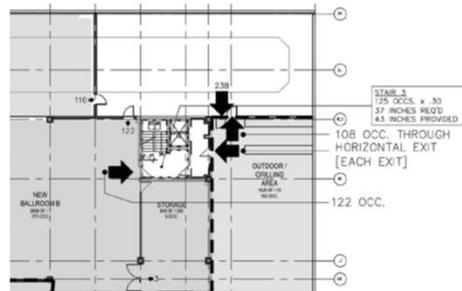
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Means of Egress

- Space Area
- Occupant Load
- Required Egress Capacity
- Provided Egress Capacity
- Number of Exits or Exit Access Doors



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Floor Area per Occupant Table 1004.1.2



TABLE 1004.1.2
MAXIMUM FLOOR AREA ALLOWANCES PER OCCUPANT

FUNCTION OF SPACE	OCCUPANT LOAD FACTOR ^a
Educational	
Classroom area	20 net
Shops and other vocational room areas	50 net
Exercise rooms	50 gross
Group H-5 Fabrication and manufacturing areas	200 gross
Industrial areas	100 gross
Institutional areas	
Inpatient treatment areas	240 gross
Outpatient areas	100 gross
Sleeping areas	120 gross
Kitchens, commercial	200 gross
Library	
Reading rooms	50 net
Stack area	100 gross
Locker rooms	50 gross
Mall buildings—covered and open	See Section 1012.2.2
Mercantile	60 gross
Storage, stock, shipping areas	300 gross
Parking garages	200 gross
Residential	200 gross
Skating rinks, swimming pools	
Rink and pool	50 gross
Decks	15 gross
Stages and platforms	15 net
Warehouses	500 gross

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Stairways

1005.3.1



- The capacity, in inches, of means of egress stairways shall be calculated by multiplying the occupant load served by such stairway by 0.3 inch per occupant.
- Where stairways serve more than one story, only the occupant load of each story considered individually shall be used in calculating the required capacity of the stairways serving that story.

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Other egress components

1005.3.2

- The capacity, in inches, of means of egress components other than stairways shall be calculated by multiplying the occupant load served by such component by 0.2 inch per occupant.



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1005.3 Exceptions

- 0.2" for stairs
- 0.15" for other egress components
- Other than H & I-2
- NFPA 13 or 13R Sprinkler systems installed throughout
- Emergency voice/alarm communication system installed throughout



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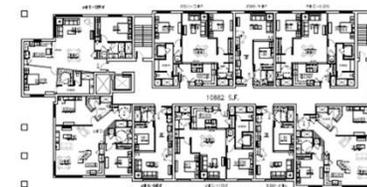
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Distribution of egress capacity

1005.5

- Where more than one exit, or access to more than one exit, is required, the means of egress shall be configured such that the loss of any one exit, or access to one exit, shall not reduce the available capacity to less than 50 percent of the required capacity.



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Egress from spaces 1006.2

- Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1.

TABLE 1006.2.1
SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

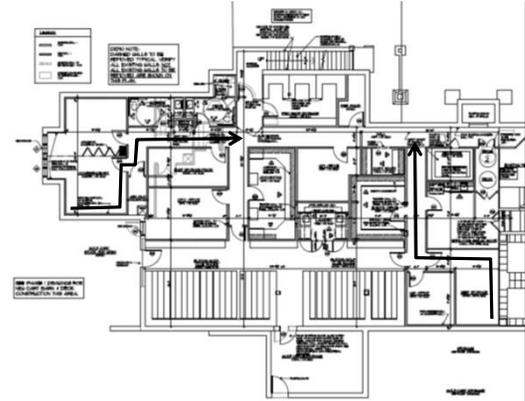
OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load	Occupant Load	
A ^c , E, M	49	75	75	75 ^a
B	49	100	75	100 ^a
F	49	75	75	100 ^a
H-1, H-2, H-3	3	NP ^b	NP ^b	25 ^b
H-4, H-5	10	NP ^b	NP ^b	75 ^b
I-1, I-2 ^c , I-4	10	NP ^b	NP ^b	75 ^a
I-3	10	NP ^b	NP ^b	100 ^a
R-1	10	NP ^b	NP ^b	75 ^a
R-2	10	NP ^b	NP ^b	125 ^a
R-3 ^d	10	NP ^b	NP ^b	125 ^a
R-4 ^e	10	75	75	125 ^a
S ^f	29	100	75	100 ^a
U	49	100	75	75 ^a

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Common Path of Egress Travel

- That portion of exit access travel distance measured from the most remote point of each room, area or space to that point where the occupants have separate and distinct access to two exits or exit access doorways.



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Three or more exits or exit access doorways – 1006.2.1.1

- Three exits or exit access doorways shall be provided from any space with an occupant load of 501 to 1,000.
- Four exits or exit access doorways shall be provided from any space with an occupant load greater than 1,000.



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Exit Access Travel Distance Table 1017.2

- Exit access travel distance shall not exceed the values given in Table 1017.2.

TABLE 1017.2
EXIT ACCESS TRAVEL DISTANCE*

OCCUPANCY	WITHOUT SPRINKLER SYSTEM (feet)	WITH SPRINKLER SYSTEM (feet)
A, E, F-1, M, R, S-1	200 ^b	250 ^b
I-1	Not Permitted	250 ^b
B	200	300 ^c
F-2, S-2, U	300	400 ^c
H-1	Not Permitted	75 ^d
H-2	Not Permitted	100 ^d
H-3	Not Permitted	150 ^d
H-4	Not Permitted	175 ^d
H-5	Not Permitted	200 ^d
I-2, I-3	Not Permitted	200 ^e
I-4	150	200 ^e

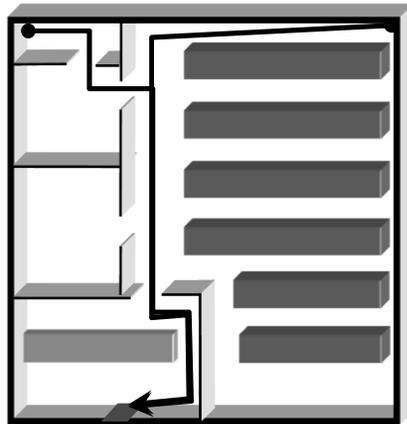
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Measurement 1017.3

Exit access travel distance shall be measured from the most remote point within a story along the natural and unobstructed path of horizontal and vertical egress travel to the entrance to an exit.



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Exit access stairways and ramps 1017.3.1

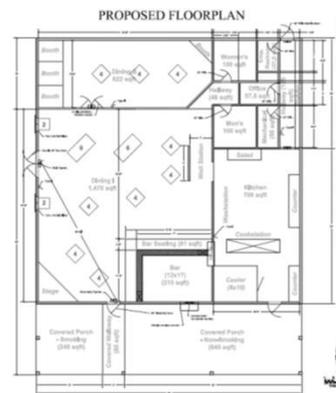


- Travel distance on exit access stairways or ramps shall be included in the exit access travel distance measurement.
- The measurement along stairways shall be made on a plane parallel and tangent to the stair tread nosings in the center of the stair and landings.
- The measurement along ramps shall be made on the walking surface in the center of the ramp and landings.

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Number of Exits & Exit Configuration 1006.3

- The means of egress system serving any story or occupied roof shall be provided with the number of separate and distinct exits or access to exits based on the aggregate occupant load served in accordance with this section.
- The path of egress travel to an exit shall not pass through more than one adjacent story.



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1006.3.3 Egress based on occupant load

TABLE 1006.3.1
MINIMUM NUMBER OF EXITS OR
ACCESS TO EXITS PER STORY

OCCUPANT LOAD PER STORY	MINIMUM NUMBER OF EXITS OR ACCESS TO EXITS FROM STORY
1-500	2
501-1,000	3
More than 1,000	4

- Each story and occupied roof shall have the minimum number of exits, or access to exits, as specified in Table 1006.3.1. A single exit or access to a single exit shall be permitted in accordance with Section 1006.3.2.
- The required number of exits, or exit access stairways or ramps providing access to exits, from any story or occupied roof shall be maintained until arrival at the exit discharge or a public way.

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1006.3.4 Single exits

- A single exit or access to a single exit shall be permitted from any story or occupied roof where one of the following conditions exists:



- 1. The occupant load, number of dwelling units and exit access travel distance do not exceed the values in Table 1006.3.2(1) or 1006.3.2(2).

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1006.3.4(1) Single exits

TABLE 1006.3.4(1)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second or third story above grade plane	R-2 ^a	4 dwelling units	125 feet
Fourth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.

b. This table is used for R-2 occupancies consisting of dwelling units. For R-2 occupancies consisting of sleeping units, use Table 1006.3.4(2).

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1006.3.4(2) Single exits

TABLE 1006.3.4(2)
STORIES WITH ONE EXIT OR ACCESS TO ONE EXIT FOR OTHER OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM OCCUPANT LOAD PER STORY	MAXIMUM EXIT ACCESS TRAVEL DISTANCE (feet)
First story above or below grade plane	A, B ¹ , E, F ¹ , M, U	49	75
	H-2, H-3	3	25
	H-4, H-5, I, R-1, R-2 ^{a,c}	10	75
	S ^a	29	75
Second story above grade plane	B, F, M, S ²	29	75
Third story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.

b. Group B, F and S occupancies in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 shall have a maximum exit access travel distance of 100 feet.

c. This table is used for R-2 occupancies consisting of sleeping units. For R-2 occupancies consisting of dwelling units, use Table 1006.3.4(1).

d. The length of exit access travel distance in a Group S-2 open parking garage shall be not more than 100 feet.

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1006.3.4 Single exits

- 2. Rooms, areas and spaces complying with Section 1006.2.1 with exits that discharge directly to the exterior at the level of exit discharge, are permitted to have one exit or access to a single exit.
- 3. Parking garages where vehicles are mechanically parked shall be permitted to have one exit or access to a single exit.
- 4. Group R-3 and R-4 occupancies shall be permitted to have one exit or access to a single exit.



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1006.3.2 Single exits

- 5. Individual single-story or multistory dwelling units shall be permitted to have a single exit or access to a single exit from the dwelling unit provided that both of the following criteria are met:

- 5.1. The dwelling unit complies with Section 1006.2.1 as a space with one means of egress.
- 5.2. Either the exit from the dwelling unit discharges directly to the exterior at the level of exit discharge, or the exit access outside the dwelling unit's entrance door provides access to not less than two approved independent exits.



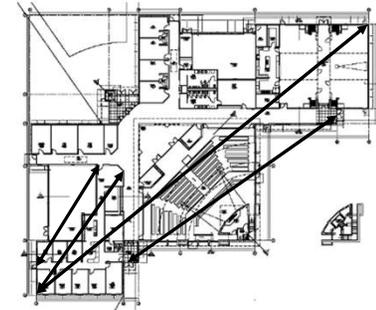
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1007.1.1 Exit & Exit Doorway Configuration

- Two exits
 - A distance apart equal to not less than 1/2 the longest diagonal
 - Exception 1
 - 1 hr. corridor
 - Exception 2
 - NFPA 13 or 13R
Sprinklered building 1/3 diagonal



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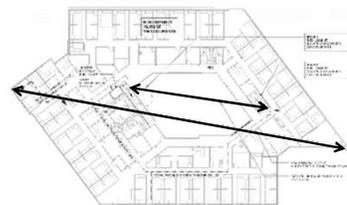
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1007.1.1.1 Measurement point

- The separation distance required in Section 1007.1.1 shall be measured in accordance with the following:

1. The separation distance to exit or exit access doorways shall be measured to any point along the width of the doorway.
2. The separation distance to exit access stairways shall be measured to the closest riser.
3. The separation distance to exit access ramps shall be measured to the start of the ramp run.



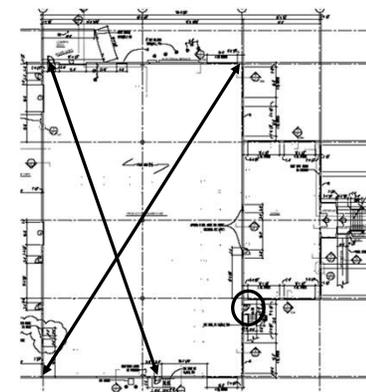
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Three or More Exits 1007.1.2

- Where access to three or more exits is required, not less than two exit or exit access doorways shall be arranged in accordance with the provisions of Section 1007.1.1.
- Additional required exit or exit access doorways shall be arranged a reasonable distance apart so that if one becomes blocked, the others will be available.



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Accessible Means of Egress

1009

- Accessible spaces shall be provided with not less than one accessible means of egress.
- Where more than one means of egress is required from any accessible space, each accessible portion of the space shall be served by not less than two accessible means of egress.



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Continuity and Components

1009.2

- Continuous to public way
- Must consist of one or more components
 - Accessible routes
 - Interior exit stairways
 - Exit access stairways
 - Exterior exit stairways serving levels other than the level of exit discharge.
 - Elevators
 - Platform lifts
 - Horizontal exits
 - Ramps
 - Areas of refuge
 - Exterior areas for assisted rescue



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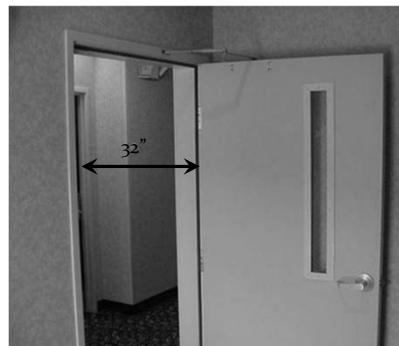
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Size of Doors

1010.1.1

- Minimum width
 - sufficient for the occupant load
 - Provide a clear width of not less than 32 inches.
 - measured between the face of the door and the stop, door open 90 degrees.
- Height
 - Minimum 80"



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Door Swing

1010.1.2

- Egress doors shall be of the side-hinged swinging door, pivoted door, or balanced door types.
 - Several Exceptions
- Side-hinged swinging doors, pivoted doors and balanced doors shall swing in the direction of egress travel where serving a room or area containing an occupant load of 50 or more persons or a Group H occupancy.



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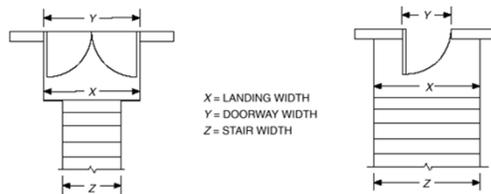
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Landings at Doors

1010.1.5

- Width not less than width of stairway or door which ever is greater.
- Length in direction of travel not less than 44”



X SHALL BE EQUAL TO OR GREATER THAN BOTH Y AND Z
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Door Operations

1010.2

- Except as specifically permitted by this section egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort.



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Panic & Fire Exit Hardware

1010.2.9



- Required in Group A or E having an occupant load of 50 or more and any occupancy of any Group H
- Refrigeration machinery room larger than 1,000 SF
- Electrical rooms with equipment rated 1,200 amperes or more and over 6 feet wide that contain overcurrent devices, switching devices or control devices with exit or exit access doors

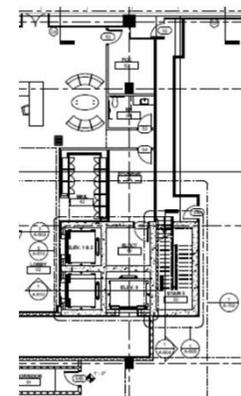
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1023.1

Interior exit stairways



- Interior exit stairways and ramps shall be enclosed and lead directly to the exterior of the building or shall be extended to the exterior of the building with an exit passageway conforming to the requirements of Section 1024, except as permitted in Section 1028.1.
- An interior exit stairway or ramp shall not be used for any purpose other than as a means of egress and a circulation path.

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1023.2 Construction



- Enclosures for interior exit stairways and ramps shall be constructed as fire barriers or horizontal assemblies, or both.

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Construction 1023.2

- 4+ stories - 2 hr. fire rated
 - < 4 stories - 1 hr. fire rated
 - all floor levels used to compute stories, including basements but not mezzanines
- Exceptions:
- I-3 Occupancies
 - Atriums
 - Section 510.2



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Termination 1023.3



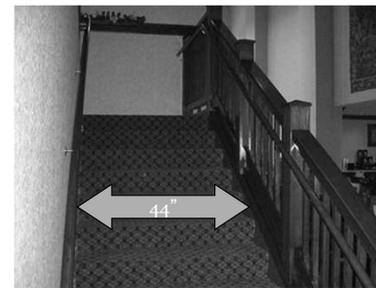
- Interior exit stairways and ramps shall terminate at an exit discharge or a public way.
- Exception: A combination of interior exit stairways, interior exit ramps and exit passageways, constructed in accordance with Sections 1023.2, 1023.3.1 and 1024, respectively, and forming a continuous protected enclosure, shall be permitted to extend an interior exit stairway or ramp to the exit discharge or a public way.

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Stairway Width 1011.2



- As determined by Section 1005.1
- Minimum 44"
- Exceptions:
 - occupant load less than 50 - 36" permitted
 - spiral stairways
 - aisle stairs
 - stairway lift in dwelling units

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Headroom

1011.3



- Stairways shall have a minimum headroom clearance of 80 inches measured vertically from a line connecting the edge of the nosings.
- Continuous to point that intersects landing at one tread depth past bottom riser
- Maintained for full width
 - spiral stairways may have 78" headroom
 - Dwelling unit openings

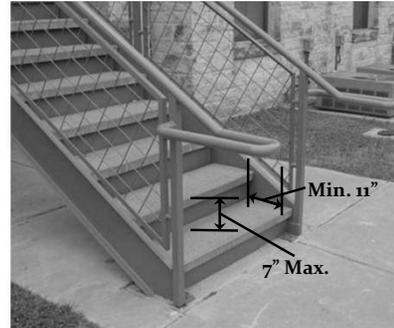
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Stair Treads & Risers

1011.5.2



- Stair riser heights shall be 7 inches maximum and 4 inches minimum.
 - Measured vertically between leading edges of adjacent tread
- Stair tread depths shall be 11 inches minimum.
 - Measured horizontally between vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge

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Stairway Landings

1011.6



- There shall be a floor or landing at the top and bottom of each stairway
 - width not less than stairway served
 - length same as width of stairway
 - straight run 48" max.
 - Doors shall not reduce width more than 1/2 required width
 - Door shall not project more than 7" when fully open

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Vertical Rise

1011.8



- A flight of stairs shall not have a vertical rise greater than 12 feet between floor levels or landings

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Ramp Slope & Cross Slope 1012.2 & 1012.3

- Means of Egress
 - one unit vertical in 12 units horizontal (8%)
- Other Ramps
 - one unit vertical in 8 units horizontal (12.5%)
- Cross Slope
 - one unit vertical in 48 units horizontal (2%)



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Rise 1012.4

- The rise for any ramp run shall be 30 inches maximum.



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Minimum Dimensions 1012.5

- Width
 - not less than required for corridors
 - 36" clear width between handrails
- Headroom
 - all parts 80"
- Restrictions
 - projections prohibited
 - doors shall not reduce clear width to less than 42"



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Landings 1012.6

- Located at top, bottom, points of turning, entrance, exit and doors
 - maximum slope 1:48
 - width same as ramp
 - minimum length 60"
 - 60" X 60" at change of direction
 - Doors per ANSI A117.1



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Edge Protection

1012.10.1

- Provided on each side of ramp and landings
- Curb, wall or barrier to prevent passage of 4" sphere within 4" of floor or ground surface



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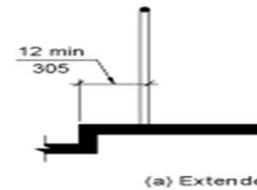
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Extended Floor or Ground Surface

1012.10.2

- The floor or ground surface of the ramp run or landing shall extend 12 inches minimum beyond the inside face of a handrail complying with 1012.



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Handrail Height

1014.2



- 34 inches to 38 inches
- Measured above stair tread nosings, or finish surface of ramp slope

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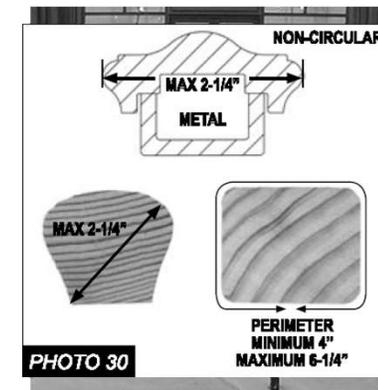
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Handrail Graspability

1014.3

- Circular cross section of 1.25" - 2"
- Not circular
 - 4" - 6.25" perimeter dimension
 - 2.25" cross-section dimension
 - edges - minimum radius of 0.01"



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PHOTO 30

PERIMETER
MINIMUM 4"
MAXIMUM 6-1/4"

Continuity

1014.4

- Handrail-gripping surfaces shall be continuous, without interruption by newel posts or other obstructions.



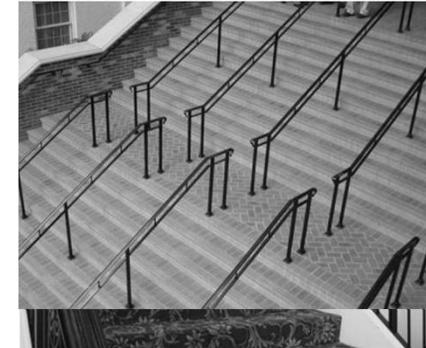
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Handrail Extensions

1014.6

- Handrails shall return to a wall, guard or the walking surface or shall be continuous to the handrail of an adjacent stair flight or ramp run.
- Where handrails are not continuous between flights, the handrails shall extend horizontally at least 12 inches beyond the top riser and continue to slope for the depth of one tread beyond the bottom riser.



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Handrail Extensions

1014.6



- At ramps where handrails are not continuous between runs, the handrail shall extend horizontally above the landing 12 inches minimum beyond the top and bottom ramps.

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Handrail Extensions

1014.6

- The extensions of handrails shall be in the same direction of the stair flights at stairways and the ramp runs at ramps.



Wrong!

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Means of Egress Illumination 1008

- Illumination shall be provided in the means of egress in accordance with Section 1008.2.
- Under emergency power, means of egress illumination shall comply with Section 1008.3.



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1008.2.1 Illumination required

- The means of egress serving a room or space shall be illuminated at all times that the room or space is occupied.
Exceptions:
 1. Occupancies in Group U.
 2. Aisle accessways in Group A.
 3. Dwelling units and sleeping units in Groups R-1, R-2 and R-3.
 4. Sleeping units of Group I occupancies.



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1008.2.1 & 1008.3 Illumination level under normal power

- The means of egress illumination level shall be not less than 1 footcandle at the walking surface.
- Along exit access stairways, exit stairways and at their required landings, the illumination level shall not be less than 10 footcandles at the walking surface when the stairway is in use.



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1008.3.1 Emergency power for illumination

- In the event of power supply failure in rooms and spaces that require two or more exits or access to exits, an emergency electrical system shall automatically illuminate all of the following areas:
 1. Aisles.
 2. Corridors.
 3. Exit access stairways and ramps.



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1008.3.2 Buildings

- In the event of power supply failure in buildings that require two or more exits or access to exits, an emergency electrical system shall automatically illuminate all of the following areas:
 1. Interior exit access stairways and ramps.
 2. Interior and exterior exit stairways and ramps.
 3. Exit passageways.
 4. Vestibules and areas on the level of discharge used for exit discharge in accordance with Section 1028.1.
 5. Exterior landings as required by Section 1010.1.6 for exit doorways that lead directly to the exit discharge.



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1008.3.3 Rooms and spaces

- In the event of power supply failure, an emergency electrical system shall automatically illuminate all of the following areas:
 1. Electrical equipment rooms.
 2. Fire command centers.
 3. Fire pump rooms.
 4. Generator rooms.
 5. Public restrooms with an area greater than 300 square feet.



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Exit Signs 1013.1

- Readily visible from any direction
- In cases where the exit or path of egress travel is not immediately visible to the occupants
- Place so no point in exit access corridor is more than 100 feet from nearest sign or the listed viewing distance



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Exit Signs Required Exceptions – 1013.1

- Rooms or areas which require only one exit or exit access.
- Main exterior exit doors or gates which obviously and clearly are identifiable as exits
- Group U and individual sleeping units or dwelling units in Group R-1, R-2 or R-3
- Dayrooms, sleeping rooms or dormitories in occupancies in Group I-3.
- Groups A-4 and A-5 on the seating side of vomitories or openings into seating areas where exit signs are provided in the concourse that are readily apparent from the vomitories. Egress lighting is provided to identify each vomitory or opening within the seating area in an emergency.

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Guards

1015

- Guards shall be located along open-sided walking surfaces, including mezzanines, equipment platforms, aisles, stairs, ramps and landings that are located more than 30 inches measured vertically to the floor or grade below at any point within 36 inches horizontally to the edge of the open side.



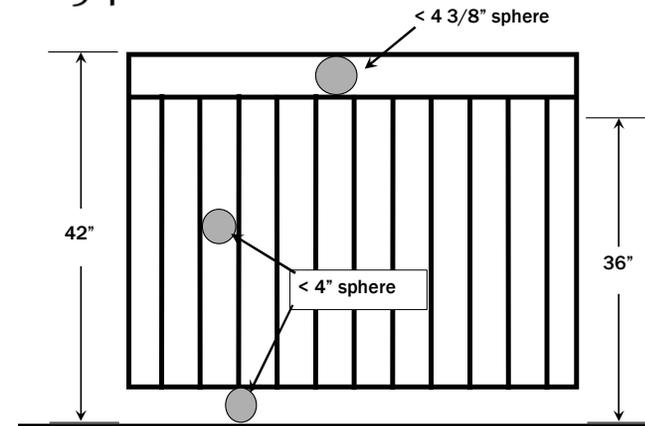
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Guard Opening Limitations

1015.4



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Corridor Construction

1020.2

- Corridors shall be fire-resistance rated in accordance with Table 1020.2
- The corridor walls required to be fire-resistance-rated shall comply with Section 709 for fire partitions.

TABLE 1020.2
CORRIDOR FIRE-RESISTANCE RATING

OCCUPANCY	OCCUPANT LOAD SERVED BY CORRIDOR	REQUIRED FIRE-RESISTANCE RATING (hours)	
		Without sprinkler system	With sprinkler system
H-1, H-2, H-3	All	Not Permitted	1 ^a
H-4, H-5	Greater than 30	Not Permitted	1 ^c
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 10	Not Permitted	0.5 ^d /1 ^e
I-2 ^f	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1 ^{b,c}
I-4	All	1	0

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Corridor Width

1020.3

- The required capacity of corridors shall be determined as specified in Section 1005.1, but the minimum width shall be not less than that specified in Table 1020.3.

TABLE 1020.3
MINIMUM CORRIDOR WIDTH

OCCUPANCY	MINIMUM WIDTH (inches)
Any facility not listed in this table	44
Access to and utilization of mechanical, plumbing or electrical systems or equipment	24
With an occupant load of less than 50	36
Within a dwelling unit	36
In Group E with a corridor having an occupant load of 100 or more	72
In corridors and areas serving stretcher traffic in ambulatory care facilities	72
Group I-2 in areas where required for bed movement	96

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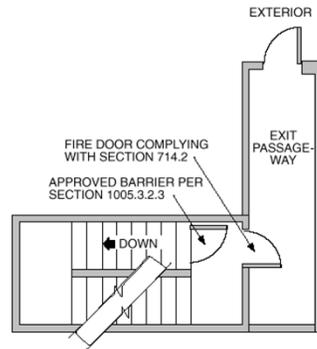
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Exit Passageway

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- An exit component that is separated from other interior spaces of a building or structure by fire-resistance-rated construction and opening protectives, and provides for a protected path of egress travel in a horizontal direction to an exit or to the exit discharge.



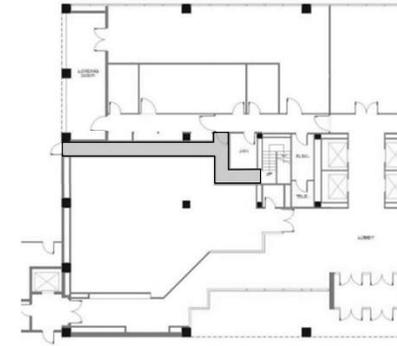
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Exit Passageway

1024

- Width per Section 1005.1, minimum 44 inches
 - Occupant load <math>< 50 - 36''</math>
- Walls, floors & ceilings 1-hour fire-resistance rated, and not less than exit enclosure rating
- Openings & penetrations restricted



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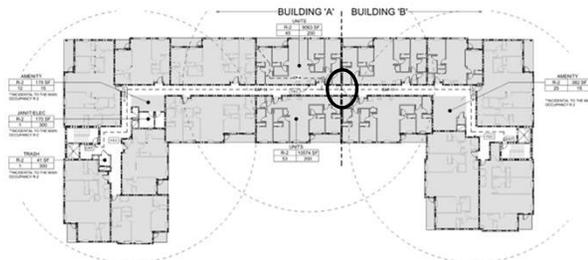
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Horizontal Exits

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- A path of egress travel from one building to an area in another building on approximately the same level, or a path of egress travel through or around a wall or partition to an area on approximately the same level in the same building, which affords safety from fire and smoke from the area of incidence and areas communicating therewith.



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Horizontal Exit

1026

- Shall not serve as only exit
- not more than 1/2 of exits or width shall be horizontal exits
- Separated by fire wall or 2 hr. fire barrier
 - Fire barrier shall extend through all levels or 2 hr. floors



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Exit Discharge

1028.1

- Exits shall discharge directly to the exterior of the building.
- The exit discharge shall be at grade or shall provide direct access to grade.
- The exit discharge shall not re-enter a building.



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Accessibility



- Chapter 11
 - Accessibility
- Chapter 10
 - Means of Egress
- IEBC
 - Existing Buildings

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Accessibility Regulations

- ABA – Architectural Barriers Act
- ADA – Americans with Disabilities Act
- FFHA – Federal Fair Housing Act
- 1973 Rehabilitation Act
- State Regulations
- Local Regulations – Building Codes
- Design Standards

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2012 IBC - Design



- 1101.2 Design:
- THIS CODE and
- ICC A117.1-2017.

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IBC – Accessible Route

- 1104.1 - Site Arrival Points
Required within the site

From:
Public Transportation Stops
Accessible Parking
Public Streets or Sidewalks



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IBC – Accessible Route

- 1104.2 – Within the site

Connecting accessible buildings
and features on the site.

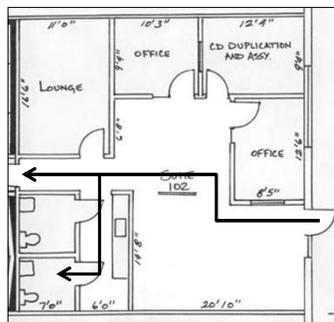


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IBC – Accessible Route



- 1104.3 – Connected Spaces

Accessible route shall
be provided to ALL
portions of the
building.

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IBC – Accessible Route

- 1104.4 – Multistory Buildings
- At least one accessible route shall connect each level.



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IBC – Accessible Route



- 1104.5 – Location

Accessible routes shall coincide with or be located in the same area as the general circulation path.

Shall be on the interior (if the general circulation path is on the interior).

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A117.1 – Accessible Route

- Chapter 4
Accessible Routes

Accessible routes required by the scoping provisions adopted by the administrative authority shall comply with the applicable provisions of Chapter 4.



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1106 – Accessible Parking and Passenger Loading Facilities

- 1106.1 – Required

- Where parking is provided...accessible parking spaces shall be provided.
- Where more than one parking facility is provided on a site, the number of parking spaces required to be accessible shall be calculated separately for each parking facility.



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A117.1 – Accessible Route

- 403 – Walking Surfaces



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A117.1 – Accessible Route

- Section 405 Ramps



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A117.1 – Accessible Route 404 Door and Doorways

- 404.1 General
Doors and Doorways part of an accessible route shall comply with 404.



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A117.1 – Accessible Route 404 Doors and Doorways

- 404.2.3.2 - Maneuvering Clearances at Doors

TABLE 404.2.3.2—MANEUVERING CLEARANCES AT MANUAL SWINGING DOORS AND GATES

TYPE OF USE		MANEUVERING CLEARANCES AT MANUAL SWINGING DOORS	
Approach Direction	Door or Gate Side	Perpendicular to Doorway	Parallel to Doorway (beyond latch unless noted)
From front	Pull	60 inches (1525 mm)	18 inches (455 mm)
From front	Push	52 inches (1320 mm) ¹	0 inches (0 mm)
From hinge side	Pull	60 inches (1525 mm)	36 inches (915 mm)
From hinge side	Pull	54 inches (1370 mm)	42 inches (1065 mm)
From hinge side	Push	42 inches (1065 mm) ¹	22 inches (560 mm) ¹
From latch side	Pull	48 inches (1220 mm) ²	24 inches (610 mm)
From latch side	Push	42 inches (1065 mm) ²	24 inches (610 mm)

¹Add 6 inches (150 mm) if closer and latch provided.

²Add 6 inches (150 mm) if closer provided.

³Beyond hinge side.

⁴In existing buildings and facilities, the dimension perpendicular to the door or gate for the front direction on the push side shall be 48 inches (1220 mm)

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A117.1 – Accessible Route 404 Doors and Doorways

- 404.2.3.3 – Sliding and Folding Doors
Shall comply with Table 404.2.3.3

TABLE 404.2.3.3—MANEUVERING CLEARANCES AT SLIDING AND FOLDING DOORS

MINIMUM MANEUVERING CLEARANCES		
Approach Direction	Perpendicular to Doorway	Parallel to Doorway (beyond stop or latch side unless noted)
From front	52 inches (1320 mm) ²	0 inches (0 mm)
From nonlatch side	42 inches (1065 mm)	22 inches (560 mm) ¹
From latch side	42 inches (1065 mm)	24 inches (610 mm)

¹Beyond pocket or hinge side.

²In existing buildings and facilities, the dimension perpendicular to the door for the front direction shall be 48 inches (1220 mm) minimum.

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A117.1 – Accessible Route 404 Doors and Doorways

- 404.2.3.4 Doorways without Doors (???)
If opening < 36" wide, then clearances required per Table 404.2.3.4

TABLE 404.2.3.4—MANEUVERING CLEARANCES FOR DOORWAYS WITHOUT DOORS OR GATES

Approach Direction	MINIMUM MANEUVERING CLEARANCES Perpendicular to Doorway
From front	52 inches (1320 mm) ¹
From side	42 inches (1065 mm)

¹In existing buildings and facilities the dimension perpendicular to the doorway for the front direction shall be 48 inches (1220 mm) minimum.

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A117.1 – Accessible Route 404.2.6 Door and Gate Hardware



Handles, pulls, latches, locks and other operable parts on doors and gates shall have a shape that is easy to grasp with one hand and does not require tight grasping, pinching or twisting of the wrist to operate.

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A117.1 – Accessible Route 407 Elevators



- Regulates:
 - Call Buttons
 - Hall Signals
 - Tactile Characters
 - Doors
 - Car Call Delays
 - Car Dimensions
 - Operating Controls

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IBC 1106 – Accessible Parking and Passenger Loading Facilities

TABLE 1106.2
ACCESSIBLE PARKING SPACES

TOTAL PARKING SPACES PROVIDED IN PARKING FACILITIES	REQUIRED MINIMUM NUMBER OF ACCESSIBLE SPACES
1 to 25	1
26 to 50	2
51 to 75	3
76 to 100	4
101 to 150	5
151 to 200	6
201 to 300	7
301 to 400	8
401 to 500	9
501 to 1,000	2% of total
1,001 and over	20, plus one for each 100, or fraction thereof, over 1,000

- 1106.2 Required
 - Where parking is provided, accessible parking spaces shall be provided in compliance with Table 1106.2, except as required by Sections 1106.3 through 1106.5.

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IBC 1106 – Accessible Parking and Passenger Loading Facilities

- 1106.6 Van Spaces
 - 1 for each 6 accessible spaces shall be van accessible



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A117.1 502 Parking Spaces

- 502.4 – Access Aisle
 - Width for Parking Spaces = 60”
 - Width for Van Parking IF space is not 132” = 96”
 - Length = As long as the space served.
 - Marking = Such to discourage parking in them.

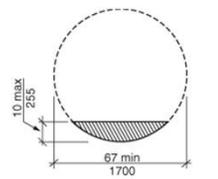


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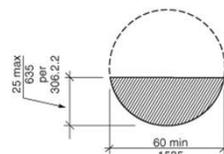
A117.1 Section 603 Toilet and Bathing Rooms



Overlap of knee and toe clearance

New buildings

- 603.2 Clearances:
- Wheelchair turning space provided per Section 304



Overlap of knee and toe clearance

Existing buildings

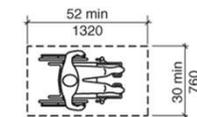
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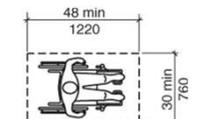
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A117.1 Section 305 Clear Floor Space

- 30” x 52” New buildings
- 30” x 48” Existing buildings
- Slope = 1:48 max.
- May include knee and toe space per 306
- One side on accessible route



New buildings



Existing buildings

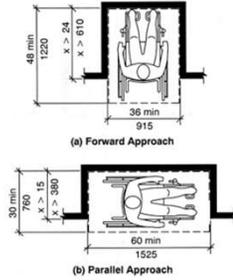
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A117.1 Section 305 Clear Floor Space

- 305.7 Alcoves
- Require additional clearances



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A117.1 Section 306 Knee and Toe Clearance

- Space provided under an element
- Used as part of clear floor space
- Shall comply with 306



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A117.1 Section 306 Knee and Toe Clearance

306.2 - Toe Clearance

1. Located between floor and 9"
2. Max. Depth = 25"
3. Min. Depth = 17" if toe depth is required for a fixture
4. Min. 30" width

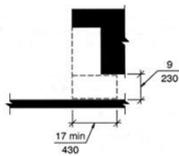


Fig. 306.2
Toe Clearance

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A117.1 Section 306 Knee and Toe Clearance

306.3 Knee Clearance

1. Located between 9" and 27"
2. Max. Depth = 25"
3. Min. Depth = 11" at 9" high and 8" at 27" high
4. Min. 30" width

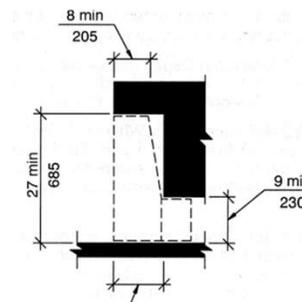


Fig. 306.3
Knee Clearance

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A117.1 Section 603 Toilet and Bathing Rooms



- 603.3 Mirrors
- Bottom of reflective surface maximum 40" above finished floor.

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A117.1 604 Water Closets & Toilet Compartments

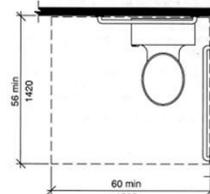


Fig. 604.3.1
Size of Clearance for Water Closet

- 604.3.1 Clearance Size
 - 60" back wall
 - 56" forward
- NO other fixtures or obstructions shall be within the WC clear space!!!!
- Overlap of other clear space OK

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A117.1 604 Water Closets & Toilet Compartments

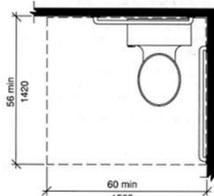


Fig. 604.3.1
Size of Clearance for Water Closet

- 604.3.1 Clearance Size
 - 60" back wall
 - 56" forward
- NO other fixtures or obstructions shall be within the WC clear space!!!!
- Overlap of other clear space OK

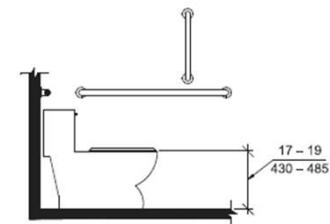
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A117.1 604 Water Closets & Toilet Compartments

Fig. 604.4
Water Closet Height



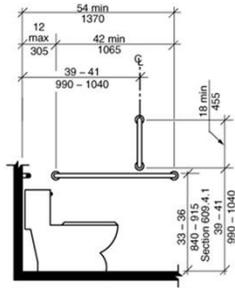
- 604.4 – Height
- WC shall be 17" to 19" AFF
- No automatic seat return to lifted condition.

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A117.1 604 Water Closets & Toilet Compartments



Note: For children's dimensions see Fig. 609.4.2

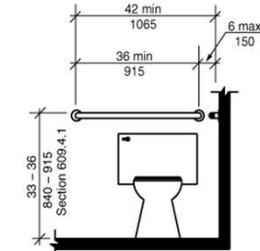
- 604.5.1 Grab bars – side wall
- Start 12” max. from back wall
- Extend 54” min. from back wall
- 18” min. vertical w/ bottom and centerline between 39-41” above finished floor

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A117.1 604 Water Closets & Toilet Compartments



Note: For children's dimensions see Fig. 609.4.2

- 604.5.2 Grab bars – rear wall
- 36 inches minimum in length,
- 6 inches maximum from the side wall, and
- 42 inches minimum from the side wall.

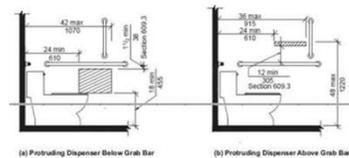
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A117.1 604.7 – TP Dispensers for Water Closets and Toilet Compartments

- ▣ Now 24” min. from the back wall
- ▣ 36” max. if above the grab bar.
- ▣ 42” max. if below the grab bar.
- ▣ 48” max. above the floor.



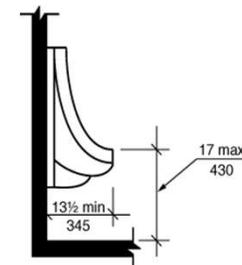
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A117.1 605 Urinals

- Rim = 17” maximum above floor
- 13½” minimum in depth
- Clear floor space shall be provided
- Flush = Automatic or per Sec. 309



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IBC 110 Other Features & Facilities



- 110.3 Sinks
- When provided, 5% but not less than one accessible per A117.1
- Except:
 - Mop or service sink

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A117.1 606 Lavatories & Sinks

- Clear floor space required
- Knee and Toe space required
- Front shall be 34" max. above floor (to the higher: rim or counter)

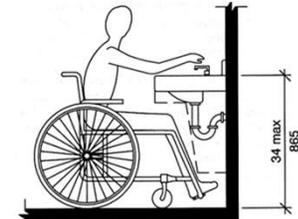


Fig. 606.3
Height of Lavatories and Sinks

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A117.1 606 Lavatories & Sinks



- 606.4 Faucets
 - Shall comply with 309
 - Self-closing – 10 sec.
- 606.6 Exposed pipes and surfaces
 - Pipes and sharp surfaces shall be insulated

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A117.1 307 Protruding Objects

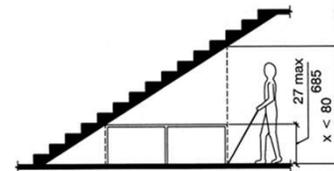


Fig. 307.4
Reduced Vertical Clearance

- 307.4 Reduced Vertical Clearance
- Guardrails or barriers are required when headroom < 80"
- 307.5 – Required clear width along an accessible route cannot be reduced by protrusions.

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IBC 1112 Signage

- Required accessible elements shall be identified by the international symbol of accessibility.



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IBC 1112 Signage



- Required Locations:
 - Accessible parking spaces
 - Passenger loading zones
 - Accessible toilet or bathing rooms where not all toilet or bathing rooms are accessible.
 - Accessible Entrances

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IBC 1112 Signage

- Accessible Check-out Aisles
- Unisex Toilet & Bathing
- Accessible Dressing, Fitting, & Locker Rooms
- Areas of refuge
- Exterior area for rescue assistance



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IBC 1112.3 Directional Signage



- Indicates nearest accessible element
 - Inaccessible building entrances
 - Inaccessible Toilets & Baths
 - Elevators not serving an accessible route
 - From separate sex toilet/bath to nearest unisex
 - Exits and exit stairs that are not part of accessible MOE

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**1210.2.1
Floors and wall bases**



- In other than dwelling units, toilet and bathing room floors shall have a smooth, hard, nonabsorbent surface that extends upward onto the walls at least 4 inches.

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**1210.2
Walls and partitions**



- Walls within 2 feet of urinals and water closets shall have a smooth, hard, nonabsorbent surface, to a height of 4 feet above the floor, and except for structural elements, the materials used in such walls shall be of a type that is not adversely affected by moisture.
- Exceptions:
 - Dwelling Units and sleeping units
 - Toilet rooms not accessible to public with one water closet

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**1503.1
Roofing**

- Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof coverings shall be designed in accordance with this code, and installed in accordance with this code and the manufacturer's approved instructions.

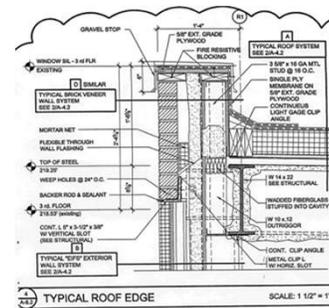


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**1503.2
Flashing**



- Flashing shall be installed in such a manner so as to prevent moisture entering the wall and roof through joints in copings, through moisture-permeable materials and at intersections with parapet walls and other penetrations through the roof plane.

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1505 Fire Classification

- The minimum roof coverings installed on buildings shall comply with Table 1505.1 based on the type of construction of the building.

**TABLE 1505.1^{a,b}
MINIMUM ROOF COVERING CLASSIFICATION
FOR TYPES OF CONSTRUCTION**

IA	IB	IIA	IIB	IIIA	IIIB	IV	VA	VB
B	B	B	C ^c	B	C ^c	B	B	C ^c

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2406.4.2 Glazing adjacent to doors.

- Within 24-inch arc of door in closed position
Exceptions:
 - Intervening wall or other permanent barrier between the door and the glazing.
 - Where access through the door is to a closet or storage area 3 feet or less in depth.
 - Glazing in walls perpendicular to the plane of the door in a closed position, other than the wall towards which the door swings when opened, in dwelling units



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1704.3 Statement of special inspections



- Where special inspections or tests are required by Section 1705, the registered design professional in responsible charge shall prepare a statement of special inspections in accordance with Section 1704.3.1 for submittal by the applicant in accordance with Section 1704.2.3.

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1705 Special Inspections

- Inspection of fabricators
- Steel Construction
- Concrete Construction
- Masonry Construction
- Wood Construction
- Soils
- Driven deep foundations
- Cast-in-place deep foundation
- Helical pile foundations
- Structural integrity of deep foundation elements
- Fabricated items
- Wind resistance
- Seismic resistance
- Sprayed fire-resistant materials
- Mastic and intumescent fire-resistant coatings
- EIFS
- Fire-resistant penetrations and joints
- Smoke Control Systems
- Sealing of mass timber
- Special Cases

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1803.1 Foundation & Soils Investigation

- Geotechnical investigations shall be conducted in accordance with Section 1803.2 and reported in accordance with Section 1803.6.
- Where required by the building official or where geotechnical investigations involve in-situ testing, laboratory testing or engineering calculations, such investigations shall be conducted by a registered design professional.



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1901.4 Concrete Construction Documents

1. The specified compressive strength of concrete at the stated ages or stages of construction for which each concrete element is designed.
2. The specified strength or grade of reinforcement.
3. The size and location of structural elements, reinforcement and anchors.
4. Provision for dimensional changes resulting from creep, shrinkage and temperature.
5. The magnitude and location of prestressing forces.
6. Anchorage length of reinforcement and location and length of lap splices.
7. Type and location of mechanical and welded splices of reinforcement.
8. Details and location of contraction or isolation joints specified for plain concrete.
9. Minimum concrete compressive strength at time of posttensioning.
10. Stressing sequence for posttensioning tendons.
11. For structures assigned to Seismic Design Category D, E or F, a statement if slab on grade is designed as a structural diaphragm (see Section 21.12.3.4 of ACI 318).

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